

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

REPORT

OF THE

DOMINION EXPERIMENTAL FARMS

FOR THE

FISCAL YEAR ENDING MARCH 31, 1917

PRINTED BY ORDER OF PARLIAMENT.

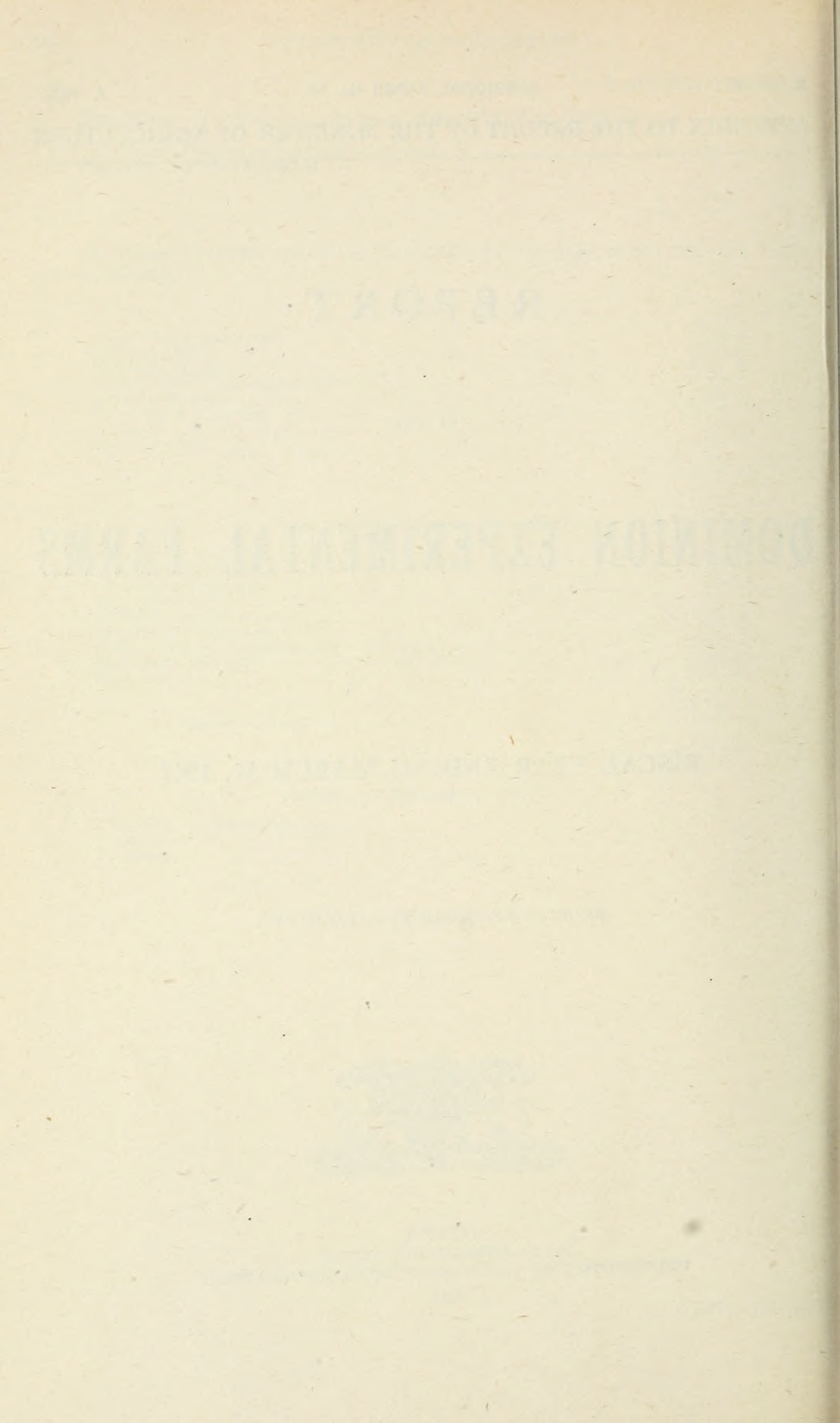


OTTAWA

J. DE LABROQUERIE TACHÉ

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1918



OTTAWA, March 31, 1917.

SIR,—I have the honour to submit herewith, for your approval, the thirtieth annual report of the work carried on at the Dominion Experimental Farms, Stations, and Sub-stations.

The accompanying report is radically different in form and scope from those of previous years. It is intended to furnish a concise but readable account of the year's operations throughout the Farms system; the data of the experimental work in any line to be published, in finished form, when such experiment is complete.

The objects in view in making this change are to further economy and efficiency. The departmental mailing lists have reached such proportions as to make the cost, labour, and time involved in the printing and distribution of a three-volume report prohibitive; moreover, the great amount of experimental work now being carried on, much of it of a complex character, makes it very difficult, if not impossible, to give a yearly detailed report of progress in such a way that the average reader can follow it easily and benefit therefrom. By issuing our findings in bulletin form, these difficulties are in a large measure avoided. I have every reason to believe that this change of plan will receive the unqualified approval of our farmers.

I have the honour to be, sir,

Your obedient servant,

J. H. GRISDALE,

Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

DOMINION EXPERIMENTAL FARMS.

J. H. GRISDALE, B. Agr., Director.

PERSONNEL.

Central Experimental Farm, Ottawa, Ont.—

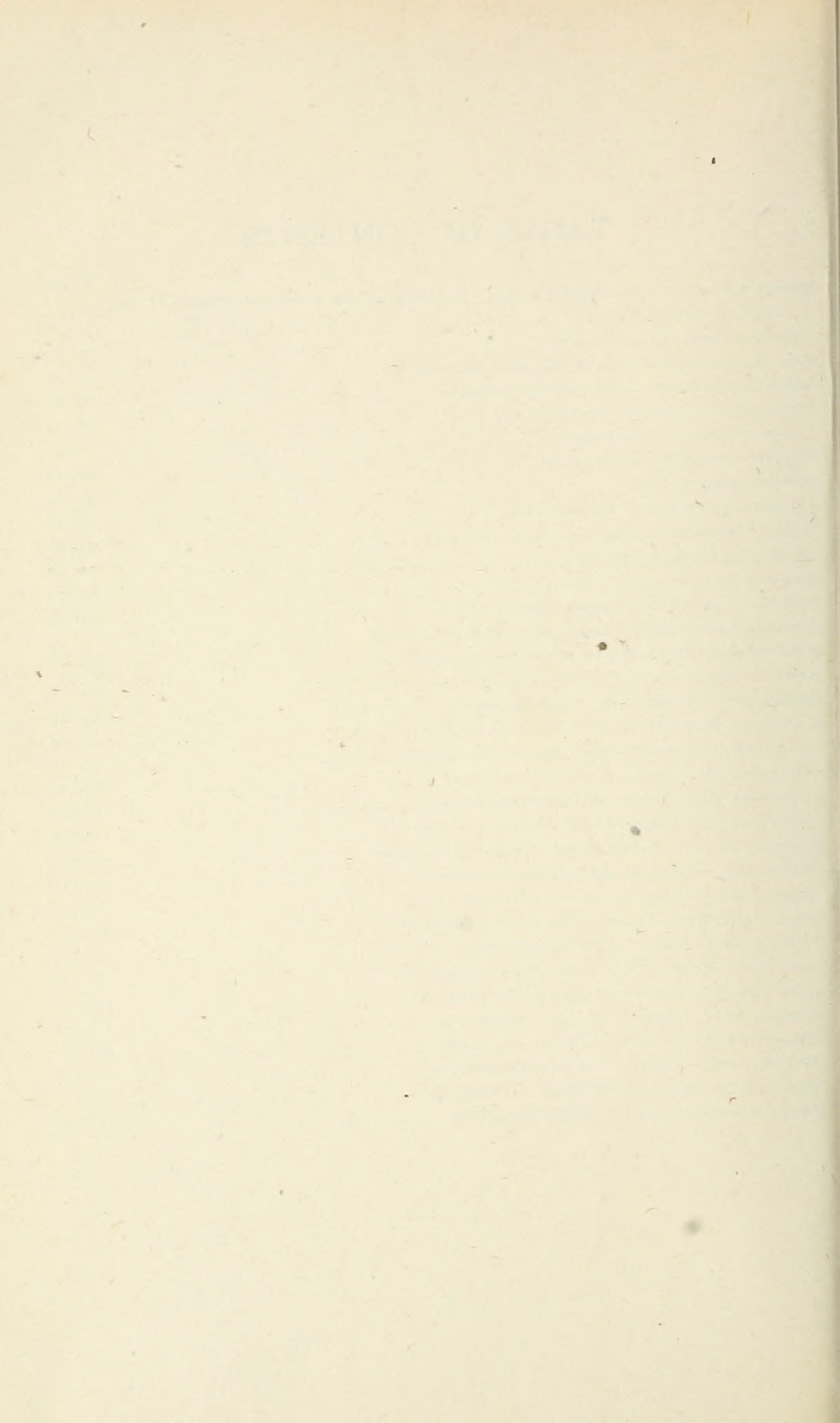
Dominion Chemist.. . . .	F. T. Shutt, M.A., D.Sc.
Assistant Dominion Field Husbandman.. . . .	W. L. Graham, B.S.A.
Dominion Animal Husbandman.. . . .	E. S. Archibald, B.A., B.S.A.
Dominion Horticulturist.. . . .	W. T. Macoun.
Dominion Cerealists.. . . .	C. E. Saunders, Ph.D.
Division of Botany.. . . .	H. T. Güssow.
Apiarist.. . . .	F. W. L. Sladen.
Dominion Agrostologist.. . . .	M. O. Malte, Ph.D.
Dominion Poultry Husbandman.. . . .	F. C. Elford.
Chief Officer, Tobacco Division.. . . .	F. Charlan.
Chief Officer, Division of Economic Fibre Production. . .	G. G. Bramhill.
Supervisor, Division of Illustration Stations.. . . .	J. Fixter.
Officer in Charge, Division of Extension and Publicity..	W. A. Lang.

Branch Farms and Stations—

Superintendent, Experimental Station, Charlottetown, P.E.I..	J. A. Clark, B.S.A.
Superintendent, Experimental Station, Kentville, N.S. . .	W. S. Blair.
Superintendent, Experimental Farm, Nappan, N.S. . . .	W. W. Baird.
Superintendent, Experimental Station, Fredericton, N.B..	W. W. Hubbard.
Superintendent, Experimental Station, Ste. Anne de la Pocatière, Que.. . . .	J. Begin.
Superintendent, Experimental Station, Cap Rouge, Que..	G. Langelier.
Superintendent, Experimental Station, Lennoxville, Que..	J. A. McClary.
Foreman-Manager, Experimental Station, Spirit Lake, Que.. . . .	P. Fortier.
Foreman-Manager, Experimental Station, Kapuskasing, Ont..	S. Ballantyne.
Foreman-Manager, Experimental Station, Morden, Man..	C. Boyle.
Superintendent, Experimental Farm, Brandon, Man.. . .	W. C. McKillican, B.S.A.
Superintendent, Experimental Farm, Indian Head, Sask..	W. H. Gibson, B.S.A.
Superintendent, Experimental Station, Rosthern, Sask. .	W. A. Munro, B.A., B.S.A.
Acting Superintendent, Experimental Station, Scott, Sask.. . . .	M. J. Tinline, B.S.A.
Superintendent, Experimental Station, Lethbridge, Alta..	W. H. Fairfield, M.S.
Superintendent, Experimental Station, Lacombe, Alta. .	G. H. Hutton, B.S.A.
Superintendent, Experimental Station, Summerland, B.C..	R. H. Helmer.
Superintendent, Experimental Station, Invermere, B.C..	G. E. Parham.
Officer in Charge, Experimental Farm, Agassiz, B.C.. .	W. H. Hicks, B.S.A.
Superintendent, Experimental Station, Sidney, B.C.. .	L. Stevenson, B.S.A., M.S.

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ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1917.

REPORT OF THE DIRECTOR

J. H. GRISDALE, B. Agr.

FIELD CROP AND LIVE STOCK NOTES FOR 1916.

While crop conditions in 1916 were, generally speaking, not so favourable as in the preceding year, the fact that 1915 was a record season for crop yields caused last year's returns to suffer unduly in comparison. The spring was a late one throughout the Dominion, and in the eastern provinces especially, excessive rainfall retarded seeding operations, while considerable low-lying land could not be sown at all.

This rainy period was followed by hot, dry weather in July and August, which, while favourable to heavy crops of well-cured hay, caused a premature ripening of cereals, and consequent reduced yields, especially in Ontario and Quebec.

In Manitoba and Saskatchewan, especially in the southern parts of those provinces, a serious outbreak of rust occurred in August, which destroyed the grain crops on large areas, and reduced the yield and grade still more widely.

In the Maritime Provinces and in British Columbia the season was a favourable one, and good crops of grains, hay, roots, and potatoes were harvested.

The total value of all field crops grown in Canada in 1916 is estimated at \$808,054,000 as compared with \$841,297,500, the revised total for 1915. The total for 1916, although lower than that for 1915, is greater than that for any other previous year.

In the following tables details are given of the yields and values of the principal field crops for the two years.

In table 3 the numbers of the various classes of live stock are given for the period 1912-16.

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TABLE 1.—Comparison of Yields and Prices obtained for the Year 1915-16.

Crop.	Average Yield per acre.		Average Price per bush.		Total Production.	
	1915.	1916.	1915.	1916.	1915.	1916.
	bush.	bush.	\$	\$	bush.	bush.
Fall wheat.....	28.81	21.50	0.91	1.53	32,391,600	20,131,000
Spring wheat.....	29.10	16.75	0.82	1.29	394,355,000	200,236,000
All wheat.....	29.08	17.00	0.83	1.31	426,746,600	220,367,000
Oats.....	45.84	35.75	0.34	0.53	523,684,000	351,174,000
Barley.....	35.55	25.00	0.49	0.82	60,699,100	41,318,000
Rye.....	21.32	20.00	0.79	1.11	2,394,100	2,896,400
Peas.....	17.73	14.46	1.66	2.22	3,478,850	2,172,400
Beans.....	16.70	12.70	3.05	5.40	723,400	412,600
Buckwheat.....	22.88	17.50	0.75	1.07	7,865,900	5,976,000
Mixed grains.....	37.54	25.33	0.57	0.90	17,523,100	10,077,000
Flax.....	13.18	11.75	1.50	2.05	10,628,000	7,122,300
Corn for husking.....	56.72	36.31	0.71	1.07	14,368,000	6,282,000
Potatoes.....	130.81	136.20	0.57	0.81	62,604,000	61,128,000
Turnips, mangels, etc.....	372.21	264.24	0.26	0.41	64,281,000	41,274,000
	tons	tons	per ton	per ton	tons	tons
Hay and clover.....	1.39	1.86	14.22	11.52	10,953,000	14,799,000
Fodder corn.....	10.00	6.65	4.96	4.92	3,429,870	1,976,700
Sugar beets.....	7.83	4.75	5.50	6.20	141,000	71,000
Alfalfa.....	2.83	2.91	12.98	10.70	261,470	261,450

TABLE 2.—Comparison of Eastern Canada, Prairie Provinces, and British Columbia as to Yields and Prices obtained.

	EASTERN PROVINCES.				PRAIRIE PROVINCES.				BRITISH COLUMBIA.			
	Average Yield per acre.		Average Price obtained.		Average Yield per acre.		Average Price obtained.		Average Yield per acre.		Average Price obtained.	
	1915	1916.	1915.	1916.	1915.	1916.	1915.	1916.	1915.	1916.	1915.	1916.
	bush.	bush.	\$	\$	bush.	bush.	\$	\$	bush.	bush.	\$	\$
Fall wheat.....	28.34	21.25	0.93	1.55	33.83	22.33	0.80	1.40	33.44	30.75	0.91	1.53
Spring wheat.....	20.83	16.23	1.10	1.65	29.11	16.76	0.82	1.28	32.43	31.00	0.96	1.54
Oats.....	36.15	25.89	0.44	0.68	53.23	41.12	0.28	0.48	61.84	60.50	0.49	0.64
Barley.....	32.87	22.56	0.60	1.01	36.71	25.79	0.45	0.77	40.36	45.75	0.64	0.83
Peas.....	17.63	14.23	1.65	2.23	21.44	26.08	1.53	2.24	29.75	33.75	1.24	1.67
Rye.....	19.55	17.15	0.82	1.19	27.41	23.19	0.73	1.04				
Flax.....	12.32	9.46	1.77	2.75	13.18	11.77	1.50	2.04				
Potatoes.....	122.01	124.73	0.62	0.89	147.69	174.31	0.44	0.59	247.28	189.00	0.45	0.70
Turnips, etc.....	387.59	256.14	0.24	0.37	252.27	273.56	0.45	0.56	455.61	500.00	0.39	0.50
	tons	tons			tons	tons			tons	tons		
Hay and clover...	1.35	1.83	14.60	11.53	1.78	1.88	8.83	7.79	2.34	2.67	14.57	17.75
Sugar beets.....	7.83	4.75	5.50	6.20								
Fodder corn.....	10.41	6.68	4.90	4.92	3.51	6.16	7.49	4.89	12.62	10.00	4.00	7.00
Alfalfa.....	2.72	2.99	13.33	9.75	2.70	2.71	10.07	10.93	3.52	2.88	14.84	15.00

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TABLE 3.—Farm Live Stock, 1912-16.

	1912.	1913.	1914	1915	1916
Eastern Provinces—					
Horses.....	1,335,628	1,436,207	1,441,381	1,442,063	1,396,760
Milch cows.....	2,079,188	2,188,824	2,097,586	2,075,750	1,998,318
Other cattle.....	2,410,671	2,479,406	1,904,976	1,848,504	1,727,773
Sheep.....	1,750,994	1,747,108	1,630,714	1,569,488	1,483,065
Swine.....	2,638,410	2,491,564	2,357,128	2,269,029	2,096,832
Western Provinces—					
Horses.....	1,296,994	1,369,283	1,445,652	1,492,681	1,532,563
Milch cows.....	491,289	516,011	539,998	553,152	565,700
Other cattle.....	1,315,681	1,336,098	1,359,464	1,450,212	1,482,645
Sheep.....	290,685	336,423	382,331	422,770	435,767
Swine.....	806,635	922,221	1,038,102	804,328	679,011
British Columbia—					
Horses.....	59,735	60,518	60,705	61,355	61,312
Milch cows.....	34,011	35,599	35,702	37,944	39,318
Other cattle.....	101,021	100,183	99,091	100,439	103,101
Sheep.....	40,702	45,000	45,000	46,404	46,269
Swine.....	32,485	34,541	39,031	38,543	37,829

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, from April 1, 1916, to March 31, 1917, giving maximum, minimum, and mean temperatures for each month; with date of occurrence; also the rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	51.97	34.54	17.43	43.25	73.4	30	18.0	3	1.65	10.50	2.70	14	0.77	7
May.....	63.19	44.83	18.35	54.00	81.8	24	33.0	3 & 10	6.89	S.	6.89	19	2.99	17
June.....	71.63	52.97	18.66	62.30	82.5	13	41.0	1	4.24		4.24	17	0.89	16
July.....	86.49	62.96	23.53	74.72	100.3	30	52.0	9	1.50		1.50	9	0.77	2
August.....	82.75	57.77	24.97	70.25	97.8	20 & 22	44.0	29	1.73		1.73	13	0.45	8
September...	68.52	49.15	19.37	58.83	83.0	13	36.0	26	3.15		3.15	17	0.89	29
October.....	55.61	35.95	19.66	45.78	76.8	5	23.6	18	2.92	S.	2.92	14	0.62	17
November...	37.97	24.28	13.68	31.12	62.4	8	— 2.0	26	1.46	3.25	1.78	13	0.45	1
December...	23.45	9.81	13.63	16.62	46.0	6	—20.0	30	0.60	18.75	2.47	16	0.85	22
January.....	17.74	0.84	20.12	10.90	33.0	4	—20.2	12	0.11	39.50	4.05	18	0.77	14
February....	16.76	—4.28	21.05	6.24	37.0	18	—25.2	3 & 12	T.	19.50	1.94	12	0.42	20
March.....	32.59	15.68	16.90	24.13	50.4	26	— 3.0	7	0.59	32.00	3.79	17	1.10	5
									24.84	126.50	37.18	179		

Rain or snow fell on 179 days during the 12 months.
Heaviest rainfall in 24 hours, 2.99 inches on May 17.
Heaviest snowfall in 24 hours, 11.00 inches on March 5.
The highest temperature during the 12 months was, 100.3° on July 30.
The lowest temperature during the 12 months was 25.2° on February 3 and 12.
During the growing season rain fell on 14 days in April, 19 days in May, 17 days in June, 9 days in July, 13 days in August, and 17 days in September.

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July shows the lowest number of days with precipitation, viz., 9.

Total precipitation during the 12 months, 37.18 inches, as compared with 35.65 inches during 1915-16.

RAINFALL, Snowfall, and Total Precipitation from 1890 to 1916-17; also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	In.	In.	In.
1890.....	24.73	64.85	31.22
1891.....	30.19	73.50	37.54
1892.....	23.78	105.00	34.28
1893.....	31.79	72.50	39.04
1894.....	23.05	71.50	30.20
1895.....	27.01	87.50	35.76
1896.....	21.53	99.75	31.50
1897.....	24.18	89.00	33.08
1898.....	24.75	112.25	35.97
1899.....	33.86	77.25	41.63
1900.....	29.48	108.00	40.72
1901.....	29.21	97.25	38.91
1902.....	25.94	101.75	36.10
1903.....	26.43	85.00	34.92
1904.....	25.95	108.75	36.79
1905.....	23.71	87.25	32.42
1906, January 1 to March 31.....	1.90	24.50	4.34
1906-07.....	21.73	72.50	28.94
1907-08.....	24.70	134.75	38.18
1908-09.....	22.13	107.90	32.91
1909-10.....	28.40	61.25	34.51
1910-11.....	18.94	88.25	27.72
1911-12.....	20.12	98.50	29.95
1912-13.....	32.54	106.50	43.18
1913-14.....	21.51	70.25	28.51
1914-15.....	16.77	78.50	24.67
1915-16.....	22.66	120.00	35.65
1916-17.....	24.84	126.50	37.18
Total for 27 years and 3 months.....	681.83	2,540.50	935.82
Average for 27 years.....	25.25	94.09	34.66

RECORD of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1916, to March 31, 1917.

Month.	Number of days with sunshine.	Number of days without sunshine.	Total hours sunshine.	Average sunshine per day.
April.....	23	7	176.0	5.86
May.....	24	7	209.7	6.76
June.....	27	3	194.2	6.47
July.....	30	1	312.7	10.08
August.....	29	2	275.6	8.89
September.....	26	4	159.2	5.30
October.....	28	3	166.2	5.36
November.....	23	7	111.1	3.70
December.....	20	11	86.0	2.77
January.....	18	13	76.8	2.47
February.....	22	6	133.7	4.77
March.....	28	3	173.8	5.60

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CORRESPONDENCE.

The following tables show the numbers of letters received and sent by the Divisions at the Central Farm and the branch Farms and Stations. A marked increase over the totals of last year is shown, indicating a still further widening of interest in the work of the Farms.

The number of reports, bulletins, and circulars sent out represents only a very small fraction of the Experimental Farm publications mailed, as the main distribution of these is made by the Publication Branch of the Department.

CENTRAL EXPERIMENTAL FARM.

BRANCH FARMS AND STATIONS.

Division.	Letters received.	Letters sent.		Letters received.	Letters sent.
Director.	22,942	13,617	Charlottetown.	1,607	1,949
Field Husbandry.	1,548	1,627	Nappan.	2,042	2,128
Chemistry.	4,256	3,835	Kentville.	1,817	1,843
Horticulture.	7,194	9,445	Fredericton.	1,745	1,798
Cereals.	21,005	4,926	Ste. Anne.	2,556	2,890
Botany.	3,934	4,064	Cap Rouge.	3,066	3,791
Animal Husbandry	5,361	7,436	Lennoxville.	2,062	1,922
Agrostology.	1,082	1,798	Brandon.	3,611	3,506
Poultry.	5,339	7,219	Morden.	103	103
Tobacco.	4,038	3,105	Indian Head.	8,917	8,814
French Correspondent . .	8,713	8,442	Rosthern.	1,519	2,110
Apiary	1,526	1,457	Scott.	1,943	2,853
Extension and Publicity. .	43,370	3,178	Lethbridge.	5,267	5,973
Illustration Stations. . .	2,474	3,190	Lacombe.	4,234	3,614
Miscellaneous.	10,559	3,991	Summerland	1,089	862
			Invermere.	737	758
	143,341	77,330	Agassiz.	3,812	3,220
			Sidney.	1,577	1,322
				47,704	49,456

Reports, Bulletins, and Circulars.

Reports and bulletins mailed.	115,324
Circulars.	110,223

The total number of letters received at all points in the Farm system will be seen to be 191,045, while 126,786 were sent out.

DISTRIBUTION OF SAMPLES.

The distribution of samples of seed grains and potatoes was again carried on during the past winter. From Ottawa, some 10,500 samples were sent out. The distribution from the branch Farms and Stations is confined to potatoes, of which the following numbers were mailed to applicants from the Farm or Station indicated: Charlottetown 11, Fredericton 315, Nappan 422, Kentville 360, Brandon 497, Indian Head 1,714, Rosthern 215, Scott, 233, Lethbridge 1,142, Lacombe 796, Agassiz, 407.

The total distribution from the Central and branch Farms was 16,639 samples.

Some special distributions were also made, such as tobacco from the Central Farm; trees, shrubs, and tree seeds from the prairie Farms; sweet corn, vegetable, and flower seeds from the Stations at Lennoxville and Cap Rouge, Que.; strawberry plants from Nappan, N.S., etc.

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PUBLICATIONS ISSUED

During the year the following publications have been sent to press:—

The Annual Report of the Experimental Farms for the year 1915-16.

Bulletins, Regular Series—

No. 87, The Principles of Poultry House Construction, by F. C. Elford, Dominion Poultry Husbandman.

No. 88, The Preparation of Poultry Produce for Market, by the same author.

No. 89, Poultry Keeping in Town and Country, by the same author.

In the Second Series the following have been issued—

No. 27, Soil Fertility, by Dr. F. T. Shutt, Dominion Chemist.

No. 28, Flax for Fibre, by J. Adams, Assistant Dominion Botanist.

No. 29, Cranberry Culture, by M. B. Davis, Assistant in Horticulture.

No. 30, Feeding for Beef in Alberta, by W. H. Fairfield and G. H. Hutton.

No. 31, Gopher Destruction, compiled by J. H. Grisdale.

Circulars—

No. 12, The Black or Stem Rust of Wheat, by H. T. Güssow.

No. 13, Garden Making on Vacant Lots, by W. T. Macoun, Dominion Horticulturist.

Pamphlets—

No. 14, The Home Vegetable Garden, by W. T. Macoun, Dominion Horticulturist.

Special Circulars—

No. 1, Grain Growing on the Prairies, by J. H. Grisdale, Director, Dominion Experimental Farms.

No. 2, Maximum Crops, 1917, by W. L. Graham, Assistant Field Husbandman.

No. 3, Varieties of Grain Recommended for Use in Canada, by Dr. C. E. Saunders, Dominion Cerealists.

No. 4, Notes on the Cultivation of some Staple Vegetables, by W. S. Blair, Superintendent, Experimental Station, Kentville.

No. 5, Preparing Farm Horses for Summer Work, by E. S. Archibald, Dominion Animal Husbandman.

No. 6, Produce More Poultry Products, by F. C. Elford, Dominion Poultry Husbandman, and Geo. Robertson, Assistant.

No. 7, The Dairy Cow, by E. S. Archibald, Dominion Animal Husbandman.

No. 9, Recommended Varieties of Field Roots, by F. S. Browne, Assistant, Division of Forage Plants.

No. 10, Field Beans, by W. L. Graham, Assistant Field Husbandman.

A number of additional exhibition circulars were issued, together with revised editions of many of those formerly brought out. Altogether, some ninety-five of these circulars are now in print. "Seasonable Hints" Nos. 5, 6, and 7, were brought out and distributed during the year.

ENLISTMENTS AND CASUALTIES.

We record below the enlistments from the Experimental Farms Branch from April 1, 1916, to March 31, 1917:—

Following this is a list of casualties among members of this branch from the beginning of the war up to the close of the fiscal year of 1916-17:—

ENLISTMENTS DURING FISCAL YEAR ENDING MARCH 31, 1917.

Blair, W. T.
Cannon, A.
Campbell, L.
Campbell, Wm.
Davis, M. B.
Fader, R.
Fahey, T.
Foley, Wm.
Fraser, J.
Gregory, O.
Halfpenny, E.
Hatherall, F.

Heatherton, W.
Hirsch, R. J.
Hunter, H.
Joyce, M.
Kemp, A.
King, Wm.
Lindsay, C.
Matthews, V.
McCrady, D. W.
McDonald, H.
McDonald, J.

Morley, A.
Paris, R. J. C.
Pollock, A.
Ramsay, R. L.
Ronaldson, B.
Smith, A.
Snider, H.
Verne, B.
Ward, N. A.
Williams, G.
Williams, J. C.

CASUALTIES.

V. Armstrong, killed in action.
J. W. Boston, killed in action.
R. I. Donaldson, killed in action.
G. Dorgans, wounded.
F. L. Drayton, wounded.
C. F. W. Dreher, wounded.
W. A. Gordon, died.

C. Harrison, killed in action.
P. Humbert, killed in action.
H. H. Lindesay, missing, presumed killed.
R. W. Nichols, killed in action.
H. Neeley, missing, presumed killed.
R. J. C. Paris, killed in action.
S. H. Valiant, killed in action.

SESSIONAL PAPER No. 16

EXPERIMENTS AT FORT VERMILION, ALTA.

The season of 1916 was a very favourable one in all branches of the work at this Substation, and in the Fort Vermilion district. Grain and oats gave excellent crops, hay was plentiful, and potatoes gave a good yield. There was no sign of rust on the wheat, which averaged for the district about 30 bushels per acre, oats 90, and barley 65.

There was ample rainfall throughout the season. The first frost occurred August 28, but was very slight and did little damage. The first killing frost (9 degrees) came September 23. The excellent fall weather allowed of harvesting and fall work in general being completed under favourable conditions.

CEREALS.

Seven varieties of wheat were tested, namely, Prelude, Red Fife, Bishop, Stanley, Huron, Marquis, and Marquis (registered). The yields ranged from 65 bushels per acre for Huron to 49 bushels 30 pounds for Prelude, the average for the seven sorts being 57 bushels per acre. The test plots were one-thirtieth of an acre each.

Seven varieties of oats were sown: Improved Ligowo, Tartar King, Banner, Daubeney, Black Mesdag, and Garton's Regenerated Abundance. Tartar King was highest, with a yield of 108 bushels 18 pounds per acre, and Garton's Regenerated Abundance lowest, 69 bushels 8 pounds. The average yield for the six varieties was 89 bushels 2 pounds.

In barleys, five varieties, Manchurian, Success, Champion, Mensury and Hulless White were tried. Manchurian gave the highest yield 71 bushels 12 pounds. Success and Hulless White were lowest with 61 bushels 12 pounds each. The average of the five varieties was 65 bushels 12 pounds per acre.

Arthur and Prussian Blue peas gave yields of 39 bushels 30 pounds and 39 bushels, respectively.

Spring rye and flax were tried on the Station for the first time.

The flax attained an average length of 26 inches, yielding 17 bushels 8 pounds of seed and 1 ton 400 pounds straw per acre. The spring rye gave a yield of 33 bushels 42 pounds per acre.

In the vegetable garden, lettuce, radish, table beets, carrots, onions, parsnips, cabbage, cauliflower, tomatoes, spinach, cucumbers, asparagus, squash, peas, and beans were successfully grown, and a good yield obtained with almost all varieties tested. Ripe tomatoes were being picked by the end of August.

The results with vegetables at the Fort Vermilion Station have been almost uniformly successful. The method followed is to set aside twice as much land as will be needed each season. Fifteen loads of manure per acre is applied, then the land is ploughed 7 inches deep, and surface cultivation given to keep down weeds and conserve moisture. The land to be planted next spring is not ploughed again, but given surface cultivation to form a good seed-bed. During the growing season sufficient cultivation is given to keep up a loose surface mulch. By following this system most of the preparatory work can be done when other farm work is not pressing.

The potato crop in 1916 was above the average. Six varieties were tested, namely, Rochester Rose, Early Rose, Gold Coin, Carman No. 1, Irish Cobbler and King Edward, the latter being a new variety tried for the first time.

Gold Coin gave the highest yield, 450 bushels 30 pounds per acre, and Early Rose the lowest, 315 bushels 20 pounds. The average yield per acre of the six varieties was 378 bushels 31 pounds per acre.

Five varieties of field corn were grown for ensilage. The warm weather and ample rainfall resulted in good crops of fodder being grown. All varieties when cut

were in good condition for making ensilage. The highest yield per acre weighed was 22 tons 200 pounds per acre from Longfellow, and the lowest, 10 tons 810 pounds from King Philip. The average yield of the five varieties was 17 tons 42 pounds per acre.

In root crops, five varieties of turnips gave an average yield of 23 tons 400 pounds per acre. Five varieties of mangels averaged 22 tons 1,500 pounds per acre. Ontario Champion and White Belgian carrots gave a crop of 17 tons 500 pounds, and 13 tons 1,000 pounds, respectively.

The plots of alfalfa and clover wintered well in 1915-16, and were cut on June 23-24. A second cutting of alfalfa was made on August 18-19. Duplicate plots of timothy, awnless brome, western rye grass, meadow fescue, and Kentucky blue grass were sown on May 26. The first season's growth was satisfactory.

Six varieties of alfalfa gave an average yield, first cutting, of 1 ton 1,650 pounds, and for the second cutting, an average of 1 ton 1,670 pounds per acre. Red clover, one cutting, gave 2 tons 380 pounds per acre. The grasses yielded: timothy, 2 tons 100 pounds; brome grass, 2 tons 1,540 pounds; and western rye, 2 tons 1,600 pounds per acre.

The season was a very favourable one for flowers, which bloomed profusely from June until October.

There was considerable winter injury of the apple and plum trees during the winter of 1915-16, but most of these recovered well and made good growth. Altogether, out of 170 trees set out in 1914, 143 were alive in 1916. Two of the cross-bred varieties of apple, Charles and Silvia, fruited in 1916.

Strawberries, of which six varieties were grown, gave fair yields.

TABLE of Meteorological Observations taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1916, to March 31, 1917, showing maximum, minimum, and mean temperature, the highest and lowest for each month, with date of occurrence; also rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	48.37	19.58	28.79	33.97	60.0	26	- 3.0	3	.....	.....	.....	.....	.....	.....
May.....	61.09	31.56	29.53	46.32	79.5	19	22.0	2	1.90	.....	1.90	5	1.25	7
June.....	71.66	40.75	30.91	56.20	84.0	29	28.9	5	1.98	.....	1.98	9	1.25	4
July.....	71.20	43.66	27.53	57.42	87.5	1	33.2	24	4.04	.....	4.04	13	1.50	14
August.....	69.57	37.70	31.81	53.60	82.9	13	24.0	31	0.42	.....	0.42	4	0.19	7
September...	60.50	31.87	28.63	46.18	77.5	18	22.9	23	1.56	.....	1.56	5	1.05	10
October.....	43.04	20.85	22.19	31.94	66.0	10	8.9	31	0.83	1.50	0.98	4	0.75	13
November...	23.61	- 1.62	25.23	10.99	47.9	17	-23.0	12	.....	2.75	0.27	4	0.10	2
December...	-3.24	-26.00	22.76	-14.62	18.9	4	-55.0	11	.....	8.00	0.79	5	0.25	11
January.....	-4.80	-30.64	26.16	-17.56	42.0	8	-60.0	31	.....	4.50	0.44	7	0.10	10
February.....	1.23	-24.97	26.20	-11.87	29.5	15	-71.0	1	2.00	0.20	2	0.15	15
March.....	25.48	-11.64	37.13	6.92	41.9	28	-39.0	2	16.50	1.65	3	0.80	30
									10.73	35.25	14.23	61		

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SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

—	Mean Tem- perature.	Highest Tem- perature.	Lowest Tem- perature.	Total Precipi- tation.	Heaviest in 24 hours.	Total hours sunshine.	Average sunshine per day.
<i>April.</i>	°	°	°	Ins.	Ins.		Hrs.
Ottawa.....	43.25	73.4	18.6	2.70	0.77	176.0	5.86
Fort Vermilion.....	33.97	60.0	-3.0	.....	.....	247.0	8.23
<i>May.</i>							
Ottawa.....	54.00	81.8	33.0	6.89	2.99	209.7	6.76
Fort Vermilion.....	46.32	79.5	22.0	1.90	1.25	275.7	8.89
<i>June.</i>							
Ottawa.....	62.30	82.5	41.0	4.24	0.89	194.2	6.47
Fort Vermilion.....	56.20	84.0	28.9	1.98	1.25	367.9	12.26
<i>July.</i>							
Ottawa.....	74.72	100.3	52.0	1.50	0.77	312.7	10.08
Fort Vermilion.....	57.42	87.5	33.2	4.04	1.50	280.3	9.04
<i>August.</i>							
Ottawa.....	70.25	97.8	44.0	1.73	0.45	275.6	8.89
Fort Vermilion.....	53.60	82.9	24.0	0.42	0.19	318.9	10.28
<i>September.</i>							
Ottawa.....	58.83	83.0	36.0	3.15	0.89	159.2	5.30
Fort Vermilion.....	46.18	77.5	22.9	1.56	1.05	195.9	6.53
<i>October.</i>							
Ottawa.....	45.78	76.8	23.6	2.92	0.62	166.2	5.36
Fort Vermilion.....	31.94	66.0	8.9	0.98	0.75	111.9	3.60
<i>November.</i>							
Ottawa.....	31.12	62.4	-2.0	1.78	0.45	111.1	3.70
Fort Vermilion.....	10.99	47.9	-23.0	0.27	0.10	62.9	2.09
<i>December.</i>							
Ottawa.....	16.62	46.0	-20.0	2.47	0.85	86.0	2.77
Fort Vermilion.....	-14.62	18.9	-55.0	0.79	0.25	56.9	1.83
<i>January.</i>							
Ottawa.....	10.90	33.0	-20.2	4.05	0.77	76.8	2.47
Fort Vermilion.....	-17.56	42.0	-60.0	0.44	0.10	89.5	2.88
<i>February.</i>							
Ottawa.....	6.24	37.0	-25.2	1.94	0.42	133.7	4.77
Fort Vermilion.....	-11.87	29.5	-71.0	0.20	0.15	108.6	3.87
<i>March.</i>							
Ottawa.....	24.13	50.4	-3.0	3.79	1.10	173.8	5.60
Fort Vermilion.....	6.92	41.9	-39.0	1.65	0.80	166.0	5.35

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RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1916, to March 31, 1917.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April...	28	2	247.0	8.23
May.....	29	2	275.7	8.89
June.....	29	1	367.9	12.26
July.....	29	2	280.3	9.04
August.....	31	0	318.9	10.28
September.....	25	5	195.9	6.53
October.....	20	11	111.9	3.60
November.....	18	12	62.9	2.09
December.....	16	15	56.9	1.83
January.....	22	9	89.5	2.88
February.....	21	7	103.6	3.87
March.....	27	4	166.0	5.35

EXPERIMENTS AT GROUARD, ALBERTA.

Snow had disappeared from the cultivated land by April 15, and prospects were bright for early seeding. The work was interrupted, however, by wet weather, and seeding was not completed until May 4. By the 13th all grains were up and growing well in spite of rather cold weather.

On June 1, there was a heavy frost, and several farmers had to resow their grains. The weather throughout the month was cool and dry.

There was an abundant rainfall on July 4 and 5, the weather became warmer, and the remainder of the season was favourable to growth, although with some quite cold nights.

On August 10, frost affected the grain slightly in certain districts, but not on the Substation.

Cereals.—Three varieties of oats, two of barley, three of wheat, and one of peas were sown on May 1 in one-twentieth acre plots. The peas were destroyed by frost on August 10. The following results were obtained:—

	Date of Maturity.	Days Maturing.	Yield per acre.
			bush. lb.
Oats—			
Daubeney.....	Aug. 18	110	38 8
Banner	Sept. 2	125	57 2
Lizowo	Sept. 2	125	51 6
Barley—			
Manchurian.....	Aug. 26	118	29 28
Success.....	Aug. 8	100	21 32
Wheat—			
Prelude	Aug. 15	107	19 20
Marquis	Sept. 1	124	24 20
Huron.....	Sept. 10	124	25 20

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Vegetable Garden.—Six varieties of cabbage and two of cauliflower were sown in the hotbed April 12, and transplanted June 5 and 6. Ready for use, July 13.

The following were sown in the open on May 3: *Beets*, three varieties, ready for use August 15. *Carrots*, three varieties, ready for use July 13. *Onions* all did well and gave good yields. *Lettuce*, five varieties, all did well. *Radish*, three varieties, much injured by white worms. *Peas*, seven varieties, all did well; Alaska, Gradus, and Gregory's Surprise ready for use July 15.

Tomatoes.—Five varieties promised well, but were destroyed by frost August 10. A few ripe fruits had been gathered before that date.

Flowers.—The following annuals grew well and bloomed freely: Aster, chrysanthemum, petunia, nemesia, clarkia, stocks, nicotiana, phlox drummondii, and scabiosa.

Perennials, such as poppy, digitalis, achillaea, campanula, chrysanthemum, leucanthus, gypsophila, and carnations did well.

In flowering shrubs, the lilacs suffered a little from the cold and drought. The spiræas flowered well.

Red currants and strawberries gave excellent crops. Two hybrid apple trees, Charles and Sylvia, yielded some fruit.

EXPERIMENTS AT BEAVERLODGE, ALTA.

Experimental work at this point was carried on, as during the previous year, by Mr. W. D. Albright.

The year 1916 was unfavourable to crops in the Grande Prairie district, the weather at the beginning of the year being extremely cold, a minimum temperature of 48 degrees below zero being recorded at Beaverlodge. Fall wheat and alfalfa suffered from the cold winter, and were not in a condition to withstand the unfavourable spring and early summer. Spring opened early and dry, not much precipitation being recorded until July. A severe frost on August 9 destroyed about three-quarters of the grain crop, and this was followed by another severe frost about a week later.

Three varieties of wheat were tried, the lowest, Prelude, yielding 5 bushels to the acre, while the highest, Huron, gave 34 bushels.

Victory oats yielded 98 bushels to the acre, and O.A.C. No. 21 barley, 30 bushels per acre, these being the highest yielding varieties of these grains.

Timothy and red clover gave very poor returns, owing to unfavourable weather conditions; the alfalfa gave only a fair crop, but western rye grass gave a very good yield.

Nine varieties of field roots were tried in duplicate plots, but adverse weather conditions delayed their growth, and the yields were low.

The results with garden vegetables were below the average.

Forty Manitoba maples and caraganas were wintered successfully, and transplanted from the nursery row.

A beginning was made with an experimental fruit plantation, consisting of apple trees, currant bushes, and raspberry canes. The apple trees and currant bushes made very promising development, but the raspberries were late in starting.

8 GEORGE V, A. 1918

TABLE of Meteorological Observations taken at Beaverlodge, Alberta, from April 1, 1916, to March 31, 1917, showing maximum, minimum, and mean temperature, the highest and lowest for each month, with date of occurrence; also rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	51.46	29.30	22.16	40.38	62.0	13 & 25	21.0	15	0.086		0.086	2	0.85	28
May.....	60.46	35.83	24.62	48.14	73.0	27	24.0	23	0.215		0.215	4	0.25	19
June.....	70.05	44.51	25.53	57.27	82.0	17	25.0	1	0.455		0.455	5	0.34	19
July.....	66.77	44.58	22.19	55.67	79.0	1 & 2	34.0	25	5.90		5.90	10	2.62	33
August.....	68.16	43.16	25.00	55.66	83.5	27	27.0	10	0.47		0.47	3	0.50	30
September.....	60.44	37.86	22.58	49.15	77.5	17	27.0	13	0.52		0.52	4	0.20	26
October.....	51.50	30.74	20.75	41.11	71.0	10	17.0	1	0.36	2.00	0.56	4	0.27	15
November.....	35.08	17.68	17.40	28.36	51.0	15	-12.5	11		1.00	0.1	3	0.10	22
December.....	15.18	-3.45	18.63	5.86	39.0	15	-36.5	26		15.00	1.50	6	0.40	10
January.....	11.85	-7.43	19.29	2.21	45.0	7	-52.0	30		25.00	2.50	9	0.60	25 & 26
February.....	15.46	-6.25	21.71	4.60	47.0	15	-46.0	1	0.2	8.00	1.0	5	0.30	1
March.....	31.82	10.90	20.91	21.35	40.5	17	- 1.0	14		9.50	0.95	6	0.30	13 & 29
									9.61	61.50	15.76	61		

NOTE.—Temperatures were not recorded on June 9, September 16, and December 2, therefore the mean temperature for June and September is for twenty-nine days only, and for December it is for thirty days only.

EXPERIMENTS AT FORTS SMITH, RESOLUTION AND PROVIDENCE.

FORT SMITH.

The experimental work was carried on partly at Fort Smith and partly at St. Bruno, about 20 miles distant.

Speaking generally, the season of 1916 was a favourable one, especially for vegetables. The spring opened early, and snow had disappeared by the end of April, and the land was ready for sowing by May 8-12.

Three varieties of carrots, four of onions, five of turnips, three of beets, and four of mangels were grown; also one variety of cabbage and two of tomatoes.

Five varieties of potatoes were tested.

Timely rains throughout the growing season, with a fair amount of warm weather, resulted in good yields of most garden crops. Tomatoes grew to good size, but did not mature, however, owing to lack of really hot weather. Potatoes were an excellent crop, Early Rose, Rochester Rose, and St. Albert Red (a local sort) giving the best returns.

Twelve acres of oats were sown at St. Bruno, and 2 acres at Fort Smith. In the former locality the growth was very rapid but heavy rains, at the time of heading out, destroyed the crop. At Fort Smith, where the oats had been sown earlier, the rain did no damage, and a good crop was obtained.

At the St. Bruno farm a herd of some seventy head of cattle is maintained during the summer. A pure-bred bull has been sent in to head this herd.

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FORT RESOLUTION.

The season of 1916 was not so favourable as the two preceding years. Spring was late in opening, cold weather continuing until the middle of May. Work on the land commenced May 13. A period of dry, cold weather followed seeding up to June 10, and from then on hot weather, with no rainfall, prevailed until July 3.

Under these conditions, germination was very slow, and it was not until after an abundant rainfall on July 17 and 18 that growth was general and vigorous. This was too late to allow many crops to mature before the first frosts of autumn.

Severe damage was done to the cereal crops by field-mice. These appeared in myriads during the first half of September and, it is estimated, destroyed nine-tenths of the grain crops. Three varieties of oats were tested, two of wheat, and two of barley. All these were promising a good yield when practically destroyed by the mice. Early potatoes yielded a fair crop. Growth was delayed by drought, so that the tops were still green at the time of the first frost, September 10. Four varieties were tested.

Roots.—These were kept back by drought, and the yield was only average. Mice injured the turnips considerably. Carrots were almost a failure, owing to drought.

The yield of prairie hay was not very heavy.

At present the mission has six oxen, a bull, and four cows.

Garden crops gave very light yields, owing to drought in the early part of the season. The young fruit trees made fair growth, but did not fruit.

Flowers bloomed fairly well.

METEOROLOGICAL OBSERVATIONS, 1917.

Month.	Maximum	Minimum	Rainfall.	Depth of snow.
	°	°	Ins.	Ins.
January.....	-15.8	-20.1	.....	5
February.....	- 8.3	-19.5	.....	10
March.....	-14.3	-19.4	.....	5
April.....	37.4	17.3	.....	00
May.....	54.5	31.7	0.21	2
June.....	65.5	41.4	0.28	
July.....	69.3	49	1.87	
August.....	64.5	42.5	1.13	
September.....	57.4	37	0.28	
October.....	34.7	23.4	.....	5

FORT PROVIDENCE.

The mission farm at this fort is situated on the right bank of the Mackenzie River, some 40 miles from Great Slave Lake.

The farm dates from 1865, although then it consisted merely of a small garden before a little cabin built to accommodate two people. Two years later, in 1867, the Grey Nuns of Montreal arrived to found a convent. They brought some cattle with them, the land under cultivation was increased, and has grown steadily since. The area under field crops is now over 160 acres, while about 19½ acres is devoted to vegetables, fruits, and flowers.

Among vegetables, cabbage, cauliflower, turnips, beets, onions, carrots, radish, rhubarb, and peas, generally succeed well. In fruits, strawberries, currants, and raspberries are grown. In flowers, there is a profusion of bloom from about the end of May on, from field lilies, violets, roses, poppies, and stocks.

8 GEORGE V, A. 1918

In 1916, potatoes were planted, May 18, 19, and 20. The earlier varieties came into use August 10. The yield of all sorts was an average one.

Other garden crops promised excellent yields, but early in June, vast numbers of grass-hoppers appeared, the ground near the buildings being completely covered with them. At first they devoured the tender grass only, but soon invaded the gardens and ate everything except the potatoes and lettuce. They also cut down the young wheat, but it grew up again and gave a rather light yield. The sample, however, was excellent.

EXPERIMENTAL WORK AT SALMON ARM, B.C.

The growing season, and in fact the whole year, in this district was an abnormal one. The rainfall during the growing season was very light, and the summer very cool. The winter temperature showed a great range and, as a result, serious winter damage was done to many orchards where clean cultivation had been followed until late autumn, as this kept the trees growing until winter set in and, as a result, the wood was not sufficiently matured to withstand extreme temperatures.

In the orchards on Mr. Thos. A. Sharp's farm, where the experimental work is being carried on, cultivation ceased in July, the trees suffered very little winter injury, and a very good crop was gathered in 1916. Several varieties of apple fruited for the first time, and some of these seem promising. Of the present well-known commercial varieties, the Duchess, Yellow Transparent, Wealthy, MacIntosh Red, Grimes, and Jonathan appear to be the most satisfactory in the Salmon Arm district.

In pears, the Dr. Jules Guyot produced a fair crop of very fine fruit.

The Greengage and Washington plums did well, and are popular varieties for the market.

Of cherries, the Morello and Duke seem to be the only varieties hardy enough for the district.

Peach trees, some of which had borne a small crop in previous years, were killed back to the snow-line in the winter of 1915-16. Grapevines were also killed back, but made new growth during the summer, and may fruit in 1917.

Raspberries and currants fruited well. Blackberries were killed back.

A supply of home-grown carrot seed, gathered in 1915, was tested last season in comparison with commercial seed of the same variety. The results were strongly in favour of the home-grown seed, which germinated better, and produced more vigorous plants.

METEOROLOGICAL RECORD, 1916-17.

DIVISION OF CHEMISTRY.

Correspondence and Publicity.—The correspondence from farmers, dealing with matters relating to the economic improvement of soils, the use of manure and fertilizers, the nutritive value of feeding stuffs, forage crops, etc., has very considerably increased in volume during the past year and has been satisfactorily dealt with, and, as far as may have been possible, the samples of an agricultural nature (over 2,200) submitted by farmers have been examined and reported on. The campaign for greater production has also been assisted by the writing of special articles and bulletins.

[illegible]

Meat Inspection Work.—The work in the examination of packing-house products submitted for analysis by the Meat Inspection Division, Health of Animals Branch, has increased. Over 800 samples in this connection have been analysed and reported on. Their classification may be given as follows:—

<i>Nature of Sample.</i>		Number received.
Lards, tallows, oils..		36
Preserved meats, sausages, mince meats..		76
Colouring and dye stuffs..		84
Preservatives..		101
Pickling solutions..		21
Spices and condiments..		42
Evaporated apples and waste..		462
Miscellaneous..		29
		<hr/> 851 <hr/>

Agricultural Meteorological Research.—Progress has been made in the investigation dealing with the influence of seasonal conditions on crop growth. This research, now extended through the co-operation of the Meteorological Service, gives promise of results of wide-reaching importance to Canadian agriculture.

Soils from Irrigation Tracts in Alberta.—The examination of typical soils from tracts in southern Alberta about to be placed under irrigation has been proceeded with, 225 samples being submitted to analysis. This work was undertaken with a view to assisting the Department of the Interior in its reclassification of the areas involved into irrigable and non-irrigable lands.

Insecticides and Fungicides.—Analyses of a number of insecticides and fungicides have been made, and their indicated value recorded.

Fertilizing Value of Rain and Snow.—The fertilizing value of rain and snow has been determined throughout the year. This concludes the first decade's work in the investigation. The yearly average for the ten-year period shows that 6.583 pounds of nitrogen per acre, available for crop growth, have been furnished from this source.

Feeding Stuffs and Forage Crops.—Much valuable work has been accomplished by analytical determinations of the composition and relative nutritive value of a large number of mill feeds and forage crops. Directly or indirectly, prices of milling and industrial by-products of feeding value have reached figures hitherto unknown in the Dominion, and there is no immediate prospect of their reduction. Further, while many of the well-known feeds have been kept up to their standard quality, there have appeared on the market not a few that are exceedingly poor—some practically worthless, and these are sold at prices little, if anything, below those of feeds far superior in nutritive value. Under these conditions the economical purchasing of concentrates has become a problem of no small importance, one that it well repays to study closely, and especially will this be true on farms requiring large amounts of bought feed. More than ever before, the farmer must study not merely the relative prices of the various feeds upon the market, but also their composition, especially as to their percentages of protein, fat, and fibre. Price is not invariably and inevitably an indication of nutritive value. This we have repeatedly shown, and the farmer must endeavour to correlate price with composition before making his selection. If in this he needs assistance, we shall be glad to advise, provided he can furnish the necessary information as to prices and the quality of the feeds he has under consideration.

The by-products used as feeds find their value, chiefly: first in their protein content and, secondly, in their percentage of fat or oil. A low percentage of fibre enhances their nutritive value.

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Brans and Shorts.—During the year examinations were made of samples taken from brans and shorts used in the feeding experiments at the Central Experimental Farm by the Division of Animal Husbandry. These samples fairly represent those products as milled and sold by several of the larger milling companies of Canada.

Bran.—In the brans, protein, the most valuable of the nutrients, ranged from 13.23 per cent to 15.58 per cent, with an average of 14.42 per cent. The average from a series of Canadian brans, analysed by us in 1903, was 14.52 per cent. In fat the members of the series differ from one another merely in fractions of one per cent, the average being 4.74 per cent. In fibre, recent samples show more variation than usual, the range being 7.91 per cent as a minimum and 11.19 per cent as a maximum, with an average of 9.80 per cent. The average for the 1908 samples was slightly higher, 10.40 per cent.

The Commercial Feeding Stuffs Act calls for the following standard for bran: protein not less than 14 per cent, fat not less than 3 per cent, and fibre not more than 10 per cent.

Shorts.—As in 1903, we find the shorts slightly higher than bran in protein content. The limits of these examined during the year are 15.41 per cent and 16.14 per cent, with an average of 15.74 per cent. The average for the 1908 samples was 15.93 per cent.

In fat, the samples now referred to vary from 3.16 per cent to 6.32 per cent, the average being 4.60 per cent, as compared with an average of 5.24 per cent of fat in the 1903 samples.

The fibre-content of shorts should be considerably lower than that of bran. The average of the present samples is 6.47 per cent, decidedly higher than that found in 1903, which was 5.23 per cent.

The standard quality fixed for shorts by the Commercial Feeding Stuffs Act reads: protein not less than 15 per cent, fat not less than 4 per cent, and fibre not more than 8 per cent.

Miscellaneous Mill Feeds.—Of the mill feeds sent in by farmers, many were found to be of exceedingly low nutritive value. Among such may be cited, particularly, laboratory numbers 27455 and 28738, which consisted essentially of fibrous oat hulls.

Effect of Rust on Wheat Straw.—The feeding value of straw from wheat affected with rust has been made the subject of an inquiry. The occurrence of rust in certain districts of Manitoba and Saskatchewan last season (1916) makes the results obtained of considerable importance at this time. Briefly, the data indicated that rust tends to arrest the development of the wheat plant, inducing a premature ripening of the plant and resulting in a straw of presumably greater feeding value than that of normally matured wheat and in a much shrivelled grain slightly higher in protein than the larger, plumper grain from rust-free wheat. The deduction as to the superior feeding quality of the rusted straw was made from the analysis based on its higher percentage of protein and its lower fibre-content, as compared with rust-free straw. It is worthy of note that several farmers reported that straw, more or less rusted, was eaten by cattle with avidity, and that it was taken in preference to fully mature rust-free straw. It, however, should be added that cattle entirely refuse straw that is very seriously affected with rust.

Relative Value of Field Roots.—The investigations regarding the feeding value of field roots—mangels, turnips and carrots—and the quality of sugar beets for factory purposes, as grown on the several Farms and Stations of the system, have been continued.

Yield and keeping quality are usually the two factors chiefly considered by the farmer in making his selection of varieties, and rightly so; but our investigation,

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carried on since 1904, has conclusively shown that the several varieties offered for sale—and especially so in the case of mangels—differ considerably in their nutritive value. The nutritive value or feeding qualities of field roots will be measured by their dry-matter content and the percentages of sugar in the dry matter. Since difference in these particulars may in certain cases amount to almost 100 per cent, it will be in the interest of the farmer to consult these records when deciding on the varieties to grow.

Mangels.—Unfortunately, the season of 1916 at Ottawa was most unfavourable for root culture. Owing to an exceedingly wet spring; sowing was very late, and the summer was exceptionally hot and dry. These conditions, coupled with the fact that the roots under experiment were sown on a muck soil which was ill suited to withstand this untoward season, resulted in very poor yields of small roots which, taking the series—twenty-six varieties—as a whole, are decidedly lower in dry matter and sugar than those previously examined at Ottawa.

The variety, Giant Half Sugar White headed the list with 10.37 per cent of dry matter and 5.15 per cent of sugar, while at the bottom of the list appears the Svalof Red with but 6.24 per cent of dry matter and 0.92 per cent of sugar.

Mangels, Source of Seed.—Very interesting data are furnished in this connection, for they permit a comparison of the quality of mangels grown from Canadian seed produced on several of the Experimental Farms and Stations and from seed obtained in commerce, which was probably of United States or European origin.

Three varieties of mangels are represented in the series, and the roots analysed were all grown on the Central Experimental Farm, Ottawa.

In the case of Danish Sludstrup, seed from three Experimental Farms and Stations—Agassiz, B.C.; Charlottetown, P.E.I.; and Kentville, N.S.—and commercial seed was sown. In dry-matter content and sugar the roots from the Canadian-grown seed, in all three instances, have given higher results than those from commercial seed. It must be remarked, however, that the roots from the Kentville seed, though quite satisfactory as to dry matter, are markedly low in sugar, and that the Charlottetown seed produced roots but slightly superior to those from the purchased seed. Seed of Mammoth Long Red was used from three sources—Charlottetown, Ottawa, and commercial. The roots from the Charlottetown and Ottawa seed are practically identical as to composition, and approximately 2 per cent richer in dry matter than the mangels from the commercial seed. Similarly, the mangels from Canadian seed contain about twice as much sugar as those from the commercial.

The sources of seed used for the Yellow Intermediate variety were the same as for the Mammoth Long Red. The differences in dry matter between the roots are not marked, yet, such as they are, favour the mangels from Canadian-grown seed. Of the three, the roots from the Charlottetown seed are decidedly the richer in sugar.

It is very satisfactory to note that, throughout the series, the mangels from the Canadian-grown seed have proved superior to those from the commercial seed.

Sugar Beets for Factory Purposes.—During the season of 1916 three varieties of sugar beets were grown on seventeen Experimental Farms and Stations of the system. This inquiry as to the suitability of soil and climatic conditions in the several provinces for the growth of sugar beets for factory purposes was begun in 1902, and the data so amassed increase in value with each year's results. The work to date has conclusively shown that beets of excellent quality for sugar extraction have been produced in the larger number of provinces, and we are thus in a position to state that in so far as the quality of the raw material—the sugar beet—is concerned, the further development of the beet sugar industry in Canada might be successfully prosecuted at many points.

Hitherto, the seed used in this investigation has been procured from Messrs. Vilmorin, Andrieux et Cie., Paris, France, the noted breeders of sugar beets, the

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varieties being Vilmorin's Improved, Klein Wanzleben, and Très Riche. Owing to war conditions, however, we were unable to obtain a supply of seed from this firm for the season of 1916. This was most unfortunate, as thereby the continuity of the investigation was, in a certain measure, broken. We were, however, able to procure a supply of good, suitable seed through the courtesy of the Dominion Sugar Company, Wallaceburg, Ontario, though particulars as to the "breeding" of the seed and the names of the varieties supplied could not be furnished. The varieties used are designated German, Italian and Ontario, by which it is intended simply to indicate that the three lots of seed were grown in Germany, Italy and Ontario, respectively. Presumably, however, they are from varieties, the value of which for factory purposes has been well established, for the results give ample evidence of the high quality of the produce.

According to the superintendents' notes, the season of 1916 has been unfavourable for sugar-beet culture at a number of the Farms and Stations. Taken as a whole it has been a poor year from the climatic or seasonal standpoint; nevertheless, the data show the results to have been most satisfactory at a majority of the Farms and Stations. The average sugar content in juice of the beets at four of the seventeen localities was over 19 per cent; at six, between 18 and 19 per cent; at one, between 17 and 18 per cent; at two, between 14 and 16 per cent; and at two, between 12 and 14 per cent.

In addition to the foregoing series, in which the beets were grown on the Dominion Experimental Farms and Stations, a number of samples of sugar beets from farmers and others throughout the Dominion have been received and analysed.

Well Waters from Farm Homesteads.—The analysis of well waters from farm homesteads continues an important branch of our work.

It may be desirable to point out again that our work in this connection is restricted to the examination of farm supplies and those of creameries and cheese factories. Analysis cannot be undertaken of mineral waters, waters of alleged medicinal value, and the water supplies of cities and towns.

Farmers desiring an analysis should apply to the Division for the instruction form which gives directions regarding the quantity of water required, the method of collection, shipment, etc. A large number of water samples are received every year, which it is quite impossible to submit to analysis owing to insufficient quantity, dirty containers, etc. Expense and disappointment will be obviated if the "instructions" are first obtained. No fee is charged for the analysis, but the express charges on the sample must be prepaid.

In reporting the results to the sender of the sample, a full, detailed account is given of the nature of the pollution (where such has been found) and the possible means of purification.

The Year's Work in Water Analysis.—Classifying our reports on these waters, we find that 14 per cent were pronounced as of first-class quality; 25 per cent as suspicious and probably dangerous; 32 per cent as seriously polluted; and 19 per cent as too saline to be potable.

Fertilizer Materials.—The continued and ever-increasing interest in the subject of liming and the application of ground limestone has led to the analysis of samples of limestone from many parts of the Dominion. These, for the most part, have been sent in by provincial agricultural authorities or associations of farmers about to install a crushing plant for the manufacture of ground limestone. Limestones are of variable composition, and since their value for the preparation of ground limestone depends on their percentage of lime, it becomes a matter of great importance to know the richness of any particular outcrop or deposit before the work of grinding is undertaken. The carbonate of lime content of the samples examined during the year ranged from

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52.15 to 97.75 per cent. Those containing over 90 per cent are considered of first quality.

Marl is a naturally occurring carbonate of lime, which, owing to its generally soft and friable nature when air-dried, can be readily prepared and easily and uniformly applied to the land. The work of the year has included the analysis of marl from deposits occurring in many parts of Canada. Samples that have been air-dried will, as a rule, contain from 50 to 75 per cent of carbonate of lime; those of superior quality may exceed 90 per cent.

The scarcity of potash in the fertilizer markets has made the analysis of wood-ashes, and ashes from various industrial processes, of particular interest. Information has been furnished as to the fertilizing value of city garbage, ashes etc., and analysis made of several other by-products of a similar character considered of no importance agriculturally.

As in previous years, the fertilizing value of a number of natural organic deposits, mucks, muds, etc., both of fresh and salt-water origin, has been determined. Many of these materials are useful amendments, while in others the plant-food constituents may be present in traces only. The use of air-dried peat and muck as an absorbent litter in the cow barn and piggery is extending. In this way much liquid manure is saved that would otherwise be lost, and the bulk or amount of manure available for application largely increased.

INVESTIGATIONAL WORK WITH FERTILIZERS.

The investigational work with fertilizers, under the immediate supervision of Mr. B. Leslie Emslie, C.D.A., F.C.S., has been considerably extended during the year, and is now carried on at nine of the Farms and Stations of the system.

Experiment "A."—This experiment, designed to ascertain the most profitable quantity and proportional composition of a fertilizer as judged by its influence throughout a three-year rotation period, embraces forty-eight fertilized or manured plots. In the year 1915, experiment "A" was commenced on the Experimental Farms and Stations at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., Cap Rouge, Que., and Agassiz, B.C.; and, in the year 1916, at Nappan, N.S., Lennoxville, Que., and Sidney, Vancouver Island, B.C.

Experiment "B."—This is an accompaniment of experiment "A," and was introduced at the Farms and Stations already named. Its object is to ascertain the relative efficiency of nitrate of soda and sulphate of ammonia as sources of nitrogen, and of acid phosphate, basic slag, and bone meal as sources of phosphoric acid. Experiment "B" embraces fifteen plots variously fertilized. The duration of the test is a three-year rotation period.

Seaweed-Fertilizer Experiment.—In order to ascertain the fertilizing value of dried, ground seaweed, prepared experimentally at Clarke's Harbour, N.S., during the summer of 1915, experiments with the material were conducted last season (1916) on the Farms and Stations at Charlottetown, P.E.I., Kentville, N.S., Nappan, N.S., Fredericton, N.B., Cap Rouge, Que., Lennoxville, Que., and Ottawa. In addition to these, a large number of co-operative experiments with the ground seaweed were conducted by farmers in the Maritime Provinces and Quebec. Whereas, in many instances, the results indicated no very appreciable influence of the seaweed fertilizer, in others—a large majority—the favourable effects were quite decided. The average results from over forty experiments reported showed that ground seaweed alone produced an appreciable increase, and, when supplemented with a phosphatic fertilizer, a quite notable increase over the yield from the unfertilized check plot. A plot with the phosphatic fertilizer alone yielded similarly to that which received ground seaweed alone.

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Experiments with Lime and Ground Limestone.—At the Experimental Station, Kentville, N.S., remarkable evidence of the beneficial influence of ground limestone—on the growth of clover particularly—has been obtained. It was evident that the ground limestone permitted a more profitable use of the various fertilizers applied in conjunction therewith.

At the Experimental Station, Cap Rouge, Que., an extensive and comprehensive experiment to ascertain the comparative influence of corresponding applications of burnt lime and ground limestone was commenced in the year 1910. The results from the first crop of the rotation have been recorded.

At the Experimental Station, Fredericton, N.B., waste lime, consisting of a mixture of burnt lime, hydrated lime and ground limestone (carbonate of lime) was employed in several experiments.

Miscellaneous Experiments.—Especially noteworthy are the experiments with market garden crops, at Fredericton, N.B. These have been conducted annually since the year 1914, and each year furnishes accumulating evidence of the greater profits which may be expected from the use of 15 tons, per acre, of manure with suitable fertilizers than from that of 30 tons per acre of manure alone.

An experiment designed to ascertain the comparative values of manure and clover in the maintenance of humus in the soil was commenced last year (1916) at Cap Rouge, Que.

Experiments with dog-fish scrap, conducted throughout a three-year rotation period at the Experimental Stations of Kentville, N.S., and Fredericton, N.B., were concluded last year (1916). The data thus secured indicate the fish scrap to have been a valuable source of nitrogen—not greatly inferior in this respect to nitrate of soda and sulphate of ammonia.

Other experiments, not less interesting than those singled out for special mention, are in progress.

DIVISION OF FIELD HUSBANDRY.

REPORT OF THE ASSISTANT DOMINION FIELD HUSBANDMAN, W. L. GRAHAM, B.S.A.

The work of the Field Husbandry Division for the past year was conducted along similar lines to those in former years, and included investigations in soil management, crop management and agricultural engineering. These investigations are being carried on at the several branch Experimental Farms and Stations and, in a limited way, at the Central Farm, Ottawa. With regard to the latter the fact is again emphasized that suitable land is not available for carrying on various important experimental tests that should be included and conducted by this Division.

Notwithstanding this handicap, the following data have been gathered during the season:—

WEATHER CONDITIONS AND CROP YIELDS.

The season was most unfavourable for seeding operations. The weather was excessively wet, making work on the land tedious and discouraging. After repeated interruptions, seeding was completed out of season, some areas being sown two and even three times to secure a stand. However, growth was rapid, with prospects for a fair harvest. Hay grew luxuriantly, and a bumper crop of good quality resulted. Grain also did well but ripened prematurely, thus giving a low yield of inferior quality. Roots, forage corn, and potatoes were only fair, but favourable harvest weather prevailed. Conditions for fall ploughing, which was completed in good season, were also satisfactory.

YIELD of Field Crops, Central Farm, 1916.

Crop.	Area.	Total Yield.		Average yield per acre.	
	Acres.	Ton. lb.	Bush. lb.	Ton. lb.	Bush. lb.
Corn	33	411 1,045		12 941	
Oats	39		1,534 30		41 14
Oat straw	39	46 411		1 370	
Hay	33	152 775		4 1,235	
Mangels.....	3	31 735	1,254 35	10 912	413 12

Cost of Production of Field Crops.—The following data of the cost of production of corn, oats, and hay have been obtained for the year 1916. These results, as well as those for rotations, are determined from fixed values used from year to year regardless of fluctuations in labour and market prices:—

Crop.	Area.	Yield per acre.		Cost to Produce.		
				Per acre.	Per ton.	Per bushel.
	Acres.	Tons.	Bush.	\$ cts.	\$ c.	Cents.
Corn	33	12.46	..	27 44	2 20	
Oats.....	39		44.4	15 98		27.3
Oat straw.....	39	1.19		15 98	3 22	
Hay.....	33	4.62		19.97	4 32	

ROTATION OF CROPS.

For various purposes, fifteen rotations are under way at this Farm. From these tests important conclusions have already been drawn, and the results now being obtained are providing valuable data. The rotations being conducted under regular farm conditions are as follows:—

Rotation “A” (five years’ duration).—Hoed crop, manured; seeded down with clovers and grass; clover hay, top dressed with manure in autumn; timothy hay, field ploughed in August, top worked and ribbed up in October; grain, seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation “B” (five years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass, seeds top-dressed with manure in autumn; clover hay, ploughed in autumn; grain seeded down with clovers and grass; clover hay.

Rotation “C” (four years’ duration).—Hoed crop, manured; grain seeded down with clover and grass; clover hay; timothy hay, field ploughed in August, top worked and ribbed up in October.

Rotation “D” (three years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

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*Soiling Crop Rotation "R" (three years' duration).—*Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass; clover hay to cut green.

The records for the past year from the rotations outlined in the foregoing are given herewith.

Cost, Returns, and Net Profits or Losses of Rotations "A," "B," "C," "D," and "R," 1916.

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit or loss per acre.
	\$ c.	\$ c.	\$ c.
A (five years' duration).....	17 73	19 32	1 59
B (five years' duration).....	17 58	16 75	—0 83
C (four years' duration).....	17 69	17 16	—0 53
D (three years' duration).....	20 29	19 64	—0 65
R (three years' duration).....	18 73	24 66	5 93

CULTURAL INVESTIGATIONS.

Shallow Ploughing and Subsoiling versus Deep Ploughing.—For this experiment two four-year rotations are used, differing only in the preparation of the sod areas, for roots or corn, as indicated in the foregoing heading. The results to date have failed to show any decided advantage in favour of either method.

Commercial Fertilizer as a Part Substitute for Barnyard Manure.—Four four-year rotations are used in this experiment, which is designed to supply information regarding the fertilizer merits of:—

- (1) No manure or fertilizers, but pastured one year in four.
- (2) Barnyard manure.
- (3) Complete commercial fertilizer.
- (4) Barnyard manure and commercial fertilizer.

Again the results show a distinct advantage in using barnyard manure alone over commercial fertilizers alone for this soil, but indicate a possibility of combining the two when barnyard manure is scarce or high priced.

DRAINAGE.

In the autumn of 1916 the already efficient drainage system of the Farm was extended to drain rotation areas "B," "C," and "D." The main drain is completed, and laterals have been placed in those plots broken this season. It is purposed to drain the remaining areas of these rotations as the plots come under the plough.

MISCELLANEOUS.

During the year, besides attending to the duties of the Division, considerable time was devoted to field crop and fall fair judging. Also, ten weeks during the summer were taken up with agricultural land classification work for the Provincial Government of New Brunswick.

DIVISION OF ANIMAL HUSBANDRY.**REPORT OF THE DOMINION ANIMAL HUSBANDMAN,
E. S. ARCHIBALD, B.A., B.S.A.**

A very successful year may be reported for the live stock on the Central Experimental Farm. The conditions as to housing, feeding, and general management of the stock were excellent. The abundant supply of ensilage remaining over from the previous winter, and the generous quantity of green feeds supplied by the Field Husbandry Division, maintained the milk flow of the cows and the growth of the young cattle, in spite of poor pastures and partial crop failures. The pasture areas are still much too limited for progressive work with the sheep and swine.

There are now 528 head of live stock in the stables, made up as follows: 153 dairy cattle, 31 horses, 156 sheep, and 188 swine. All the live stock have made a very good showing during the past year. The amount of experimental work was greater than the previous year, and more satisfactory. The sales of dairy products amounted to \$12,650.16; of dairy cattle, \$4,237; of sheep, of mutton, and wool, \$1,535.99; and of swine, for breeding purposes and for pork, \$4,360.69. These sales, coupled with the increased values of the various herds and flocks, the value of manure and the horse labour supplied to other Divisions, makes a sum total of \$44,204.87, which is an excellent return from the live stock on a 200-acre farm.

HORSES.

The horses do all the labour connected with the various Divisions on this Farm. At present there are thirty-one head of horses, which include twenty-three draught horses and draught colts, four expressers, and four drivers. The heavy draught horses include four imported Clydesdale mares, one Canadian-bred Clydesdale mare, and two grade Clydesdale mares. All the horses are in excellent condition. Breeding operations with horses have been very successful on this Farm during the past year, and the crop of excellent filly foals is making substantial progress. One of the imported Clydesdale mares has, this spring, again dropped a splendid foal, and four other mares give every promise of foaling normally. Experimental work along the lines of feeding, care, and management of pregnant mares and foals is most promising for the future.

The horse labour supplied to the various Divisions for the past year amounted to 7,635 days, which, at the conservative valuation of 70 cents per day, gives a total return of \$5,344.50.

Considerable experimental feeding with work horses has been conducted during the past year, this work being largely an accurate comparison of crushed *versus* whole grains for work horses.

BEEF CATTLE.

During the past fiscal year, some Shorthorn calves were purchased with a view of obtaining figures as to the production and marketing of baby beef.

DAIRY CATTLE.

The pure-bred dairy herds are Ayrshire, French-Canadian, Holstein, and Jersey. All these herds have given satisfactory returns. The total number of pure-bred cattle of the four above-mentioned breeds now amounts to 134 head.

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Dairy Cattle Feeding Experiments.—A number of new phases of dairy cattle feeding experimental work have been undertaken during the year. The four lines of work given greatest prominence were: first, an investigation into the most successful succulent roughages for summer feeding, largely a comparison of ensilage *versus* soiling crops; secondly, the study of the protein values of various concentrated meals on the markets, and the amounts of meals which may be profitably fed the milch cows; thirdly, a study of the comparative values of roots of various classes for feeding of milch cows; and, fourthly, a continuation of the work of investigating the most economical methods of calf rearing, with and without whole milk, skim-milk, and other dairy by-products in conjunction with various calf meals.

Milking Machines.—Another very successful year has been completed in the investigation of the commercial values of mechanical milkers. In addition to the two original machines, namely, the Sharples and Burrell-Lawrence-Kennedy, used for this investigation, there have been added the Empire, Lister, Omega, and Calf-way milkers. Although all this work is not being accurately checked bacteriologically, yet many interesting bacteriological analyses have been made to compare these machines as to cleanliness, and also in the study of best methods of cleaning. Valuable data regarding the comparative commercial and pathological values of these machines have been gathered.

Dairy Cow Returns.—Again the quality of the dairy cattle on the Central Experimental Farm has shown marked improvement. The average profit per cow has again increased over \$28.97 per annum, due largely to increased production, but also to an increased value of butter, amounting to 5 cents per pound. Particular attention is drawn to the fact that many of the best cows have not completed their lactation periods at the end of the fiscal year, hence the following table in itself is not a definite criterion in the comparison of the breeds. Following is a brief summary showing the returns of some of the cows, the profits being based on the following valuations: Butter, 35 cents per pound; skim-milk, 20 cents per hundredweight; pasture, \$1 per head per month; hay, \$7 per ton; meal, \$25 per ton; and other roughages at the usual cost prices. Attention is drawn to the marked increase in both production and profits of the best five animals in each breed.

It should also be noted that butter valued at 35 cents per pound and skim-milk at 20 cents per hundredweight is equivalent to milk at only \$1.80 per hundred pounds, while in reality the manufacture of the fancy cheeses sold in large quantities from this Farm realized \$3 per hundredweight on the milk. However, the butter basis is fair for the comparison of the various breeds in these stables, as well as with the average herds throughout Canada.

SOME Dairy Herd Records, Central Experimental Farm, 1916.

No. of Head.	Age.	Breed.	Average Days in Milk.	Average pounds Milk produced.	Average per cent Fat.	Average profit over Feed between Calvings (Labour, manure, and Calf not included).
	Years.		Days.	Lb.		\$
58	2 and over.	All breeds and grades.....	353	9,303.2	3.91	105.86
5	2	Ayrshire.....	416	11,609.6	3.78	127.39
5	2	Canadian.....	357	7,360	4.79	104.98
4	5	Grade Ayrshires.....	384	10,173	4.10	124.78
5	4	Grade Holsteins.....	415	13,571	3.97	154.78
5	2	Holstein.....	305	14,520	3.48	152.24
5	4	Jersey.....	394	7,861.7	5.46	135.88

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SHEEP.

Although the lack of pasture still is a great hindrance in the investigational work with sheep, yet this class of stock made an excellent showing during the past year, due largely to the high market values of lamb, mutton, and wool. Breeding work on a small scale with Shropshires and Leicesters has been most successful. There are now 156 head of breeding stock in the pens.

SWINE.

Considering the shortage of pasture, another very successful year is to be reported for swine husbandry on this Farm. At present there are 188 head of swine in the pens. Three breeds are maintained, namely, Yorkshires, Berkshires, and Tamworths. Many swine experts claim that there are at this Farm some of the finest breeding sows in Canada.

Several lines of investigational work in the feeding of swine have been conducted during the past year. Briefly, these are: (1) the value of tankage and other foodstuffs as milk substitutes for young pigs during and after weaning; (2) the values of soiling crops for the summer feeding of shoats in the dry lot; (3) the most economical methods of feeding, comparing the hopper grinders and self-feeders with regular hand feeding; (4) the best rations for finishing shoats for the market, and the comparative values of the protein contained in various concentrated meals for the feeding of market hogs.

BUILDING PLANS.

The Animal Husbandry Division has again, during the past fiscal year, finished the preparation of plans and brief specifications of live-stock buildings for the branch Farms. These plans have been, in turn, passed on to the Department of Public Works, and have there been used as patterns for the completed plans used in the construction of these buildings.

Many plans and specifications of farm buildings have been sent free of charge to farmers throughout Canada. These plans illustrate the various economical types of farmer's barns best suited to their needs. In all, 550 blue-prints of live-stock buildings have been made and distributed. This number is less than that of last year which decrease is accounted for largely by the loss of our draughtsman, who enlisted. Undoubtedly, also, fewer farmers are building new or remodelling buildings in these times. Many excellent barns of various sizes and types have been constructed after these plans, to the marked satisfaction of their owners.

MISCELLANEOUS.

The Dominion Animal Husbandman, in addition to his duties at the Central Experimental Farm, has officially visited, at least once during the year, all of the branch Experimental Farms in Canada where live-stock work is being conducted. He and his assistants have also spent a great deal of time attending a large number of meetings in various parts of Canada, judging at numerous exhibitions, assisting at live-stock short courses, and studying live-stock conditions and the needs for experimental and demonstrational work relating to live stock.

DIVISION OF HORTICULTURE.

REPORT OF THE DOMINION HORTICULTURIST, W. T. MACOUN.

The work of the Division of Horticulture may be divided into six main parts, relating to pomology, vegetable gardening, ornamental gardening, plant breeding, correspondence and office work, and work in connection with the branch Farms and Stations. These naturally overlap, but they indicate the principal lines of effort.

Under pomology is included the study of varieties of fruits for the purpose of getting information in regard to yield, season, quality, and profit. There is also the identification, classification, and description of the fruits, together with their propagation, planting, and care, and also experiments in cultural methods, including spraying. The exhibition and judging of fruits may also be grouped under pomology.

Vegetable gardening includes the testing of varieties to compare different strains of the same variety, and the relative merits of different varieties in regard to yield, quality, season, etc. Cultural methods and spraying are also dealt with, and the study of commercial methods, both in the field and under glass.

Ornamental gardening has to do with the cultivation of ornamental trees, shrubs, and herbaceous plants, with the study of their different characteristics, including height, form, colouring, and season of bloom, so that information will be available to Canadians to enable them to plant their places in such a way that the trees, shrubs, and herbaceous plants will blend or be contrasted with one another to form pleasing landscape effects. The forest belts and windbreaks are also included in this part of the work.

Plant breeding in the Horticultural Division is carried on from year to year in the endeavour to improve fruits, vegetables, and ornamental plants by cross-breeding and selection, and to study the laws of inheritance in different kinds and varieties of horticultural plants.

The correspondence and other office work of the Horticultural Division is growing rapidly. Of the letters received a large proportion require technical information, and it is believed that through the correspondence much assistance is rendered. The person who asks for information by letter is the one most likely to put into practice the advice given.

Much of the time of the writer is devoted to the interests of the branch Farms and Stations, the work having grown rapidly in recent years. It is the aim to help the superintendents develop the horticultural work and so to systematize the work that the results will be made of the greatest value to the people of Canada. Material such as plants, seeds, labels, record books, and other things are furnished the branch Farms and Stations from the Central Farm.

As in previous years, the writer visited the branch Farms and Stations in 1916, and conferred with the superintendents in regard to horticultural matters.

FRUITS.

Notwithstanding the very unfavourable season for apples in the province of Ontario, the crop at the Central Experimental Farm was the best one in its history. Owing to the wet weather of May and June, there was a very serious development of apple scab on both foliage and fruit in unsprayed orchards, resulting in reducing the quantity and quality of the fruit. Trees were thoroughly sprayed on the Central Farm, and the good results from this work were very apparent.

There is now such a large proportion of really hardy varieties of apples in the orchards at Ottawa that good crops are assured on some varieties practically every

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year, as the hardiest sorts are more regular bearers than those which, at Ottawa, are nearer the northern limit of their successful culture.

New Varieties of Apples Originated at Ottawa.—Reference has been made in the report from time to time to the new varieties of apples originated in the Horticultural Division. Additional varieties of great merit fruit each year, and it is difficult to decide which to retain, but there are so many places in Canada where the varieties at present on the market are either too tender or do not cover the season well, or are not good enough in quality, that a variety which might not be desirable in one place is very desirable in another, hence more are retained than would otherwise be the case. These new varieties, in addition to being tested at the Central Farm, are sent from year to year to the branch Farms and Stations, and in a few years it will be known whether they are better suited for the districts they are being tested in than are others which have heretofore been grown there. Some of the most promising varieties of these new apples are Ambo, Brock, Diana, Donald, Elmer, Joyce, Melba, Niobe, Pedro, Rocket, Rupert and Thurso.

The very great importance of having more and better varieties of hardy plums is admitted. The European, Domestica, or so-called "blue" plums are not quite hardy enough for parts of Canada as cold as at Ottawa, and while there is sometimes a crop of these, they are not reliable bearers. In the native red plum and the native American plum there are two species, however, which furnish many hardy varieties, and while most of these are not quite good enough in quality to compare favourably with the European plums, there are a few which are very desirable. The Cheney is one of these. It is one of the earliest and does well in the colder parts of Ontario and Quebec and in the Prairie Provinces. The Assiniboine is also an early variety which has done well at the Experimental Farm, Indian Head, Sask. From the native plums of Manitoba will, no doubt, be originated new varieties especially suited for conditions there. The American plums cross readily with the Japanese, and the Omaha and Emerald plums, which have been tested at Ottawa for a number of years, are very desirable varieties resulting from this cross. Some cross-breeding work with plums is done each year at Ottawa, and was continued in 1916.

The development of a hardier race of strawberries, with better-flavoured fruit, is being attempted at Ottawa by crossing the cultivated varieties with the wild species from different parts of Canada.

Fruits at the Experimental Station, Summerland, B.C.—The first orchards were planted at the Experimental Station, Summerland, B.C., in 1916, when apples, pears, plums, peaches, cherries, apricots and small fruits were set out. As irrigation is an important factor in the successful cultivation of fruits in this district an extensive series of experiments in irrigating fruit trees was begun there.

Fruits at the Experimental Station, Morden, Man., in 1916.—At the new Experimental Station, Morden, Man., there is no natural protection for fruit trees, so in 1915 caragana hedges for windbreaks were set out in the area where the first orchards were to be planted, so that these would have a start before the fruit trees were set out in 1916. In 1916, the first orchards and bush-fruit plantations were planted. About one thousand trees were set out, mainly apple trees, but a considerable number of plum trees also, and, in addition, some 27,000 seedling apple trees were planted close together in temporary rows. After these have gone through several winters it will be possible to tell which are the hardiest, and from the latter, it is hoped, will be obtained something better than is at present available for the prairies. Plantations of small fruits were also established.

Fruits at the other Branch Farms and Stations.—Good orchards have now been established at most of the branch Farms and Stations, and very useful data are being accumulated. It is in the Prairie Provinces where it is most difficult to grow trees

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fruits, and the orchards there are, from time to time, badly injured by frost. It is at such times that the value of the cross-bred apples originated by the late Dr. Wm. Saunders is demonstrated. For instance, in the winter of 1915-16, apple trees of the ordinary commercial varieties which had been bearing well at the Experimental Station, Lethbridge, Alta., were killed, while certain of the cross-bred varieties remained uninjured.

VEGETABLES.

Vegetables have been given much prominence in the horticultural work of the Experimental Farms ever since they were organized. It is now possible for a settler in almost any part of Canada to learn what varieties are best suited to his district, tests having been made far north at the substations in the Peace River and Mackenzie districts, in addition to those conducted at the many Experimental Farms and Stations scattered throughout Canada. The cultural tests, which were begun in more recent years, are proving very useful also, as, in addition to knowing what to grow, it is very important to know how to grow it, and in a country as large as Canada the same method is not always suitable for each part. An interesting result was obtained at Ottawa in 1916 with garden peas. Brush was used for supporting the vines of nineteen varieties on a certain area, while a similar area was left unbrushed. There was a decidedly greater yield from the area which was unbrushed—quite a surprising result. This experiment will be continued, as the general impression is that brushing peas will ensure a larger yield, and, doubtless, it will in some seasons and some places. The importance of obtaining seed potatoes from sources where vitality of the seed is strong was again demonstrated at Ottawa in 1916, where much larger yields were obtained from seed from other parts of Canada than from Ottawa-grown seed. The value of "sprouting" potatoes before planting was again demonstrated in 1916.

Irrigation of Vegetables.—There was a very heavy precipitation during the spring of 1916, and it was not until late in July that there was any need of irrigation from the overhead irrigation system at Ottawa, but the latter part of the summer was very dry, and marked increases from irrigation were obtained in the crops of cauliflower, cabbage, celery, ripe beans, and corn.

Growing Vegetable Seed.—Experiments were continued in 1916 in the growing of different kinds of vegetable seeds in order to get more information in regard to methods of growing each kind, and the yield which could be obtained. Very good seed of beets, carrots, parsnips, celery, cabbage, onions, spinach, and lettuce was grown.

Comparison of the crops from home-grown and imported seed shows that quite as good, or better, crops can be grown from home-grown as from imported seed if the seed has been obtained from good stock plants.

Developing Early Vegetables.—Experiments are being continued in the selection and cross-breeding of different kinds of vegetables in order to obtain earlier strains. The Alacrity tomato and Early Malcolm corn are two good varieties developed at the Central Experimental Farm, which are now in the trade. Especial attention is being paid to peas, beans, tomatoes, corn, and onions.

Information to Vacant Lot Gardeners.—The Horticultural Division did much work towards the close of the fiscal year in connection with vacant lot gardening and home vegetable gardening. Two pamphlets were published to meet the demand for information, and hundreds of letters coming direct to the Division or through the information bureau were dealt with.

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ORNAMENTAL GARDENING.

Although, during the war, special attention is being paid to the economic side of horticulture, the ornamental side has not been neglected. Hence, the testing of varieties of garden plants has been continued, cultural experiments are being tried, and at all the Farms and Stations the endeavour has been made to make the grounds attractive so as to try and induce farmers, especially, to do something more to beautify their homes so that there will be a greater incentive for their sons to come back to the farm when the war is over.

CEREAL DIVISION.

REPORT OF THE DOMINION CEREALIST, CHAS. E. SAUNDERS, B.A., Ph.D.

THE SEASON.

In contrast with the year 1915, the season of 1916 proved exceptionally unfavourable for cereals in many large districts. Indeed it is doubtful whether any year during the past quarter of a century was less favourable. It is true that in some parts of Canada the crops were excellent, but the areas where the crops were poor were very large. In the east, a large section of country suffered from excessive rains in April, May, and June, so that many fields which might have been sown with cereals had to be devoted to other crops; and, in some cases, where cereals were sown the young plants started under very adverse conditions, due to excessive moisture. The prolonged wet weather was followed almost immediately by intense heat, which continued almost up to harvest time, and prevented the grain from filling properly. Such conditions were, of course, particularly hard on cereal crops.

In the central and western provinces—Manitoba, Saskatchewan, and Alberta—there were districts where very large crops were produced, but the total yield of grain in these three provinces was rather low. Unusual damage was caused by rust, frost, and hail. Some fortunate areas, such as southern Alberta, for instance, escaped damage almost entirely, but the loss from rust in southern Manitoba and southern Saskatchewan was very heavy; and there were heavy losses in the northern parts of Saskatchewan and Alberta from an altogether exceptional frost which occurred about the 10th of August, injuring cereals on many of the low-lying fields over a large area of country. Hail caused unusual losses in several districts, the number of severe storms being quite abnormal.

In making comparisons between the crops of 1915 and those of 1916, it should be remembered that the former year was quite extraordinarily favourable. Any comparisons which are to be made should therefore take into account the average crop for a series of years rather than the remarkable crop of 1915.

MARQUIS WHEAT.

As usual, this extraordinary variety has again given remarkable returns. Last season, it created what is probably a world's record for the yield of spring wheat from a large field, when a farmer, in Southern Alberta, harvested 54,395 bushels from 1,000 acres of land. Such a wonderful yield would scarcely be credited were it not properly attested by trustworthy persons.

DISTRIBUTION OF SAMPLES OF SEED.

The annual free distribution of samples of seed grain has again been conducted. Some modifications were made in the manner of carrying it on, the chief of these being that printed application forms were furnished to those who wished to receive samples.

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In this way, it was found possible more readily to secure the desired information as to the conditions on the farms of the applicants, the results obtained from varieties previously tested, etc. As the printed forms facilitated the making of satisfactory applications, and as the announcement of the distribution in the public press was made somewhat earlier than usual, we should doubtless have had a great increase in the number of acceptable applications even without the stimulus which was furnished by high prices and scarcity of seed. As it was, our stocks of nearly all varieties—though larger than the quantities distributed in the previous year—proved quite inadequate. The total distribution this year is more than double that of last year.

The number of samples of seed grain sent out from Ottawa to the various provinces were as follows: Prince Edward Island, 36; Nova Scotia, 312; New Brunswick, 158; Quebec, 2,850; Ontario, 1,176; Manitoba, 544; Saskatchewan, 1,107; Alberta, 1,060; British Columbia, 331. Total, 7,574.

TESTS OF VARIETIES OF CEREALS.

Although the weather at Ottawa was very unfavourable for cereals, and the annual tests were therefore carried out with unusual difficulty, nevertheless some good results were obtained. At most of the branch Experimental Farms and Stations good crops were secured and useful observations were made at all of them, except at Rosthern, Sask., where the crops were entirely destroyed by hail.

Plots of Cereals, etc., at Ottawa.—In 1916, there were sown at Ottawa, 883 very small plots of cross-bred varieties not yet fixed in character, and 498 plots (chiefly small) of new varieties and selections which are now true to type and are being increased for test on a larger scale.

The regular test plots of grain, for the study and comparison of varieties, are one-sixtieth of an acre each. The number of plots of this size, last season, was as follows: Spring wheat, 254; barley, 287; field peas, 64, and flax, 31, making a total of 636 plots, and representing about 600 varieties and selected strains.

The total number of plots of all sizes was 2,017.

New varieties.—In addition to the regular tests made every year at Ottawa, a few extraordinarily promising sorts of cereals and peas are being tried at other localities on the branch Experimental Farms. It is expected that, in the near future, at least one new variety of hulless barley and one of hulless oats and one of early ripening, hard, spring wheat will be introduced to the public. The progress made in this work is necessarily slow, as it is important to avoid the premature introduction of varieties which have not been sufficiently tested.

NEW EXPERIMENTAL FLOUR MILL.

With a view to the resumption, at as early a date as possible, of the important researches in milling and baking, a new and superior experimental flour mill has been purchased, to replace the one which was lost when the cereal building was burned a couple of years ago. The new mill is capable of grinding rapidly and satisfactorily quite small amounts of wheat, thus enabling us to make flour from varieties of which only a few pounds of seed can be spared.

DIVISION OF BOTANY.

REPORT OF THE DOMINION BOTANIST, H. T. GÜSSOW.

The administration of the plant-disease section under the Destructive Insect and Pest Act forms part of the duties of the Dominion Botanist. During the year the work in connection with the investigation into white pine blister rust was continued. In Ontario were begun control measures, such as extermination of diseased vegetation—pines and currants—and the work was placed on a systematic basis with the aim in view to prevent the spreading of this disease, the seriousness of which is now being universally recognized. In New Brunswick and Nova Scotia, we are able to report that this rust has not become established. In the province of Quebec, a careful search is now being conducted, particularly along the Maine border.

Another phase of work carried on under this Act relates to disease elimination in potatoes. Powdery scab is now quite under control. Other potato diseases are also being gradually eliminated, and it would be surprising if the systematic work now conducted according to a standard method of field and yield inspection should not result in a great improvement in the quality, purity of stock, and freedom from disease of seed potatoes, as well as in quantity of yield, since the latter has been found to be affected by the presence of disease to a far greater extent than by any other cause; in fact, this is perhaps one of the most important features of the work done with potatoes, that it has been established beyond any doubt that poor yield, formerly attributed to weak strains, to degeneration and other causes, is frequently due to the presence of diseases conveyed by the seed tuber, particularly leaf-roll and mosaic disease.

A thorough investigation of the severe grain-rust epidemic was carried on during the year. As a result, two field laboratories were established, one at Brandon and one at Indian Head, in charge of trained specialists, who will devote their time to a comprehensive study of the grain rust and related problems affecting the yield of our grain crops. During the year a coloured poster, describing the nature of grain rust, together with a popular account of this disease in bulletin form, was prepared.

In continuation of some work done during the previous year, several plots were sown with flax. As in the previous year, the samples were reported on by Mr. Lockhart, of Parkhill. Although the season was the driest on record in the province of Ontario, Mr. Lockhart pronounced these samples to be the finest flax he had yet seen grown in Canada. It is felt that as there is now a separate Division to deal with fibre plants, further work on flax may safely be left to that Division.

Several plots were also devoted to hemp, both for seed and fibre. The fibre was very favourably reported on by the Doon Twines Company, Limited, and a sample of the twine manufactured from it was sent to the Central Experimental Farm for inspection.

Several plots of soy beans, the seeds of which were obtained from the United States and France, were sown and, in both instances, the seeds ripened satisfactorily. These were analysed for oil content by the Dominion Chemist.

As castor oil is one of the most important commercial oils, the seeds of this plant were obtained from various countries of Europe and also from the United States, and sown after the danger of frost was over. A considerable quantity of ripe seeds with which to carry on work next season was obtained.

Several plots were devoted to black mustard and white mustard, these being the two chief mustards used in commerce. No difficulty was experienced in growing these two crops. Favourable reports on the quality were received from Messrs. Dunn & Co., of Hamilton, Ont.

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Chicory was also experimented with. The Dominion Chicory Company, of Montreal, reported that the sample of roots submitted to them was "excellent in every way."

A considerable area was devoted to the culture of medicinal plants. Opium poppy grew well, anise and dill ripened seeds satisfactorily, belladonna survived the preceding winter, and there were also several other species under observation.

Some miscellaneous crops such as lentil, chick pea, and hyacinth bean were experimented with, and in each case some ripe seeds were obtained.

The reports from the field laboratories at St. Catharines, Fredericton, and Charlottetown indicate that the officers in charge fully realized the importance of getting in close touch with the farmers. The interpretation and demonstration of practical results, the guidance and educational propaganda conducted right on the farmer's own fields, have greatly benefited the various communities. Several interesting observations have been made which will certainly prove of great value in the immediate future. Thus, for instance, it may be remembered that spraying of potatoes has not been a very general practice in some parts of the country. It was held that spraying would eat up all profits from raising potatoes in certain localities. Our experience being the very opposite of this, it was found on investigation that there existed in such localities, very poor yields, and the profits from growing potatoes were so small indeed that additional cost of production—such as spraying—would not have been profitable. The cause of the poor yields having been determined to be due to diseases that are by no means universally recognized by the practical farmers, but which reduce the yield from year to year, efforts were then made to start with a new sound seed supply, and by spraying the crop carefully the usual benefits from spraying were once more demonstrated.

Farmers whose turnips, cabbage, or similar crops were formerly greatly depreciated in value by club root are now being shown the beneficial results from the judicious use of lime. That lime exerts an inhibiting effect on club root has been known for many years, but it was not so much the question of liming as the question of when and how to apply it, which has now been successfully demonstrated.

The free distribution of pure cultures of nodule bacteria has gained in favour, and ten times the amount of cultures formerly sent out were asked for by farmers all over the Dominion. Reports indicate clearly that good stands of alfalfa are being secured by treating seed with cultures, while, in a good many cases, untreated check plots succumbed during the first winter.

DIVISION OF BEES.

REPORT OF THE APIARIST, F. W. L. SLADEN.

The outstanding feature of the year 1916 was the unusually large crop of honey from alsike and white clover produced in Ontario, Quebec, and Manitoba, principally due to the wet spring followed by fine, warm weather when the plants were in flower. The honey was sold at a fractional advance on the prices obtained in the previous year, and was eagerly bought up by housekeepers, sugar for canning fruits being high.

PRODUCTION AT THE EXPERIMENTAL FARMS.

Bees are now being kept on fifteen of the Dominion Experimental Farms. The highest yield of honey per colony in 1916 was obtained at the Central Farm, Ottawa, where thirty-five colonies, spring count, produced 8,269 pounds, an average of 236 pounds, valued at \$24 per colony. Second came Ste. Anne de la Pocatière, with 152 pound per colony; and third, Invermere, with 117 pounds per colony. The average yield

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of honey in the fifteen apiaries was 61.9 pounds per colony, spring count, and the average price obtained for the honey was 15½ cents per pound, so that it realized \$9.69 to the colony.

A summary that has been prepared of the average annual yield of honey per colony at the different Experimental Farms during the four years 1913 to 1916, inclusive, shows that Nappan gave the highest yield, amounting to 115 pounds, which came principally from alsike, white clover, and goldenrod; Ottawa came second, producing 106 pounds, principally from alsike, white clover, and sweet clover; Lethbridge, Alta. (1914 to 1916 only) third, with 86 pounds, mainly from alfalfa; and Ste. Anne de la Pocatière, Que., fourth, with 62 pounds from alsike and white clover. While the yields at the other Farms and Stations, namely, Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., Cap Rouge, Que., Brandon, Man., Indian Head, Sask., Lacombe, Alta., Invermere, B.C., Agassiz, B.C., and Sidney, B.C., were lower for various reasons, ample evidence has been obtained that bee-keeping is profitable at each of these places.

SURVEY WORK.

During the summer of 1916 the Apiarist visited each of the Farms at which bees were kept, and made detours into promising regions in order to study their possibilities for honey production, visiting apiaries and investigating in detail the species of plants from which the honey is gathered, and the weather conditions that are most favourable for abundant production. The conclusion was reached that honey crops that will compare favourably in size and quality with those to be obtained in the best regions in North America may be secured in selected places in the Ottawa River basin, including some of the northern valleys, where raspberry, alsike, and white clover, fireweed, and certain species of goldenrod and aster form successive sources of honey. For the further investigation of this region, a co-operative experiment with bee-keepers having apiaries situated at Montcerf, Que., Lytton, Que., and Thornloe, Ont., was carried out in 1916, and is being continued.

Other promising regions visited were the district east of Winnipeg, certain rich farming and swamp lands in the Maritime Provinces, and the alfalfa districts of southern Alberta. A two days' investigation at Melfort, Sask., showed that bee-keeping is worthy of attention as a side line in this northern district. An extension of the system of co-operative experiments to these and other districts has been organized.

POLLINATION OF ALFALFA.

Further study of the wild bees believed to be instrumental in pollinating alfalfa was made by the Apiarist in the western provinces. *Megachile latimanus* Ckll. was found to be by far the most useful species tripping the flowers in southern Alberta, and *M. perihirta* Ckll. in the dry interior of British Columbia. The honey-bee visits the flowers without tripping them, and the action of bumble-bees is uncertain.

EXPERIMENT WITH BEES FROM THE SOUTH.

Two experimental shipments of bees without combs were received in the spring at the Central Experimental Farm by express from two breeders in Alabama, United States. One of them, consisting of six 1-pound packages, was fourteen days en route, and only 17 ounces of bees were found to be alive on arrival. The other shipment, consisting of three 2-pound packages, with untested queens, costing \$9.75, with \$2.50 express charges, arrived in good condition on May 10, after four day's journey, and, after having been assisted a little with combs and brood from other colonies, produced 435 pounds of honey, and built up into five strong colonies fit for wintering.

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RESULTS FROM OUT-APIARIES.

Two colonies of bees from the Central Farm were placed on the Kazabazua Plains, Quebec, for the spring and summer. Each produced an average honey crop of 260 pounds, consisting of 66½ pounds of amber honey, principally from blueberry, 132 pounds of white honey, principally from white and alsike clover, and 61½ pounds from goldenrod.

A colony was placed in a swamp at Sully, Que., for the same period, and gave 220 pounds of honey, consisting of 34 pounds from blueberry, 132 pounds mainly from clover, and 54 pounds from goldenrod.

WINTERING EXPERIMENTS.

Twenty-eight colonies of bees were wintered in the bee cellar in the new apicultural building at the Central Experimental Farm, and investigations into the ventilation, relative humidity, and temperature of the bee cellar under different weather conditions, and their effects upon the bees were carried on throughout the winter.

Experiment with Winter Stores.—An experiment was made to compare different kinds of food consumed by bees during the winter.

One of the objects of this experiment was to discover the source or sources of the hard, granulated honey, associated with a heavy mortality of bees, that has been found in some winters in several apiaries in the Ottawa valley, including the apiary at the Central Farm in 1914-15 and 1915-16. Another object was to test the value of sugar syrup as a supplementary and also as a sole food for bees in winter.

In four colonies, wintered on stores collected between June 26 and July 13, mainly from alsike and white clover, the bees were found to cover an average of 5.1 combs per colony on April 17, the honey having granulated but little.

Three colonies on stores gathered between July 24 and August 8, largely from white sweet clover (*Melilotus alba*), covered an average of only 3.2 combs, much of the honey having granulated hard. Very significant was the condition of a colony belonging to this set that was wintered outside, this colony having occupied the north corner of one of the wintering cases. When this colony was examined on April 17 the bees covered only 2½ combs and the stores consisted of about one pound of granulated dried-up honey, the cappings having been torn open by the bees in an apparent endeavour to get liquid food. The combs thus presented the same appearance as those of the colonies that died or came through very weak in the two preceding winters.

Three colonies on stores collected after August 14, principally from goldenrod (chiefly *Solidago canadensis*) and buckwheat, covered an average of 3.8 combs, and the honey was not granulated.

Two colonies on undisturbed natural stores gathered at Ottawa throughout the season, chiefly towards its end, covered an average of 4.5 combs.

Eleven colonies on undisturbed natural stores supplemented with an average of 20 pounds sugar syrup each, covered an average of 5.1 combs. (Natural stores supplemented with sugar syrup also produced better results than natural stores alone in the two preceding winters.)

Three colonies on sugar syrup without honey covered 4.3 combs. One of these had all pollen cut out of the combs on October 25, and was found to cover 3.5 combs in spring.

Three colonies on stores gathered at Kazabazua and Sully, Que., consisting largely of honey from two species of goldenrod, *Solidago purberula* and *S. squarrosa*, covered an average of 5.2 combs.

Wintering Outside.—Wintering bees outside, four hives packed in shavings, in a case, in an enclosure sheltered from wind, without attention during the winter, con-

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times to prove successful in Ottawa, the average results of the last four years showing that the bees so wintered did better than those wintered in the cellar.

In 1916-17 sixteen colonies were thus wintered in four cases, each containing four colonies placed back to back, with 3 inches of planer shavings between the hives and the sides and bottom of the cases and 10 inches on top. The outside entrances, two facing southeast and two northwest, were reduced during the winter to 1½ inches high by ¾ inch wide. The colonies wintered somewhat better than those in the cellar, the average number of combs covered per colony on April 17, 1917, in the fourteen colonies wintered on natural stores supplemented with sugar syrup being 5.4 as against 5.1 combs in eleven colonies in the cellar.

Experiment with sealed covers.—The eight hives in two of the cases were covered with double oilcloth, and the ventilators in the roofs of these cases were covered with pieces of wood, diminishing ventilation and increasing humidity. The eight hives in the other two cases had their oilcloth covers replaced by bran sacks, and the ventilators in the roofs of the cases were left open, thus allowing upward ventilation and reducing humidity. Taking the fourteen colonies on regular stores supplemented with sugar syrup, the result of the comparison was as follows:—

	Average number of combs per colony on April 17.	Estimated average weight of stores remaining in hive, April 17. Lb.
Seven colonies, sealed covers..	6.5	18.4
Seven colonies, upward ventilation..	4.3	8.4

WAX MOTH KILLED BY COLD.

A cage containing living wax moths (*Galleria mellonella*), with larvæ, pupæ, and probably eggs, was placed in the honey house in the middle of March, 1917. On the nights of March 18 and 19 the temperature in this house fell to 9°F. Next day all seemed to have been killed by the cold, and on May 30 no sign of life could be found in the cage.

PAPER CONTAINERS FOR HONEY.

In consequence of the high price and scarcity of tin pails and other containers for honey, an experiment in designing paper containers for granulated honey was started during the winter. Promising results were obtained by pouring the honey when commencing to granulate into 2-pound bags made of white bond paper, water-proofed with paraffin wax, the bags having been previously opened out on a wooden block and placed in attractive cartons.

BEE GARDEN.

The frontage between the apiary and the roadway near the apicultural building at the Central Experimental Farm has been laid out into plots in which some of the principal honey plants of Canada are being grown in order to study the effect of soil, weather, and other conditions upon the secretion of nectar.

GENERAL NOTES.

During the year the Apiarist attended and gave addresses by request at a meeting of the Leeds County Bee-keepers' Association, Athens, Ont., July 3; the annual convention of the Bee-keepers' Association of British Columbia at Vancouver, August 17; the annual convention of the Bee-keepers' Association of the Province of Quebec at Montreal, November 15; and the annual convention of the Ontario Bee-keepers' Association at Toronto, December 8 and 9; and he contributed papers to the annual convention of the Quebec County Bee-keepers' Association and the annual convention of the Manitoba Bee-keepers' Association. A number of articles, giving results of experiment and investigations, were contributed by the Apiarist to the bee-keeping and general press.

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DIVISION OF FORAGE PLANTS.

REPORT OF THE DOMINION AGROSTOLOGIST, M. O. MALTE, Ph.D.

The work of the Division of Forage Plants is steadily and rather rapidly increasing, new lines of investigation being taken up every year.

VARIETY TESTS.

Variety tests are carried out chiefly with Indian corn and field roots, including mangels, swede and fall turnips, carrots, and sugar beets. Through the variety tests much valuable information is gained about the comparative value of different trade varieties for the different parts of the Dominion. This information, accumulated during a long series of years, is made available to the Canadian farmer through the Experimental Farms' publications.

As the value of the information gained from the variety tests largely depends upon the carefulness exercised in conducting them, and perhaps still more on the carefulness with which conclusions in general are drawn, the Division is endeavouring to take every precaution possible in order to be able to present to the farmers accurate data on the true value of the varieties under test. Thus, in order to eliminate, as far as may be, all errors liable to result from variations in soil conditions in the experimental field, each variety is tested in duplicate plots and the average yield of the two plots taken as an indication of the yielding capacity of the variety. At the Central Experimental Farm, where the Division is favoured with assistance from the chemical laboratory, analysis is made of all varieties of field roots tested. The analytical data thus secured help materially, when combined with the yielding capacity of the varieties, in the calculation of the comparative values of varieties.

With special reference to the results obtained from the variety tests with field roots this year, it must be admitted that they decidedly indicate that the seed available commercially this year was, generally speaking, somewhat inferior to that of previous years. This is, however, a condition that must be considered as a natural consequence of the present scarcity of field-root seed, and the tendency to deterioration thus experienced will quite naturally disappear as soon as the world's supply begins to return to the normal.

BREEDING WORK.

Alfalfa.—The breeding work with alfalfa which was started in 1912 has now progressed to a point that enables the Division to promise, within a short time, several new, distinct varieties. A number of families of alfalfa secured through self-fertilization of promising individual plants, and planted last year, exhibit a remarkable degree of uniformity, thus bearing out the statement made in last year's report that "the expectations of the Division with regards to the development of distinct varieties in the real sense of the word seem to be well founded." As, however, the new varieties still showed some indications of not breeding completely true to type, further selection was made this year from within them. The selected plants were self-fertilized but, owing to the unfavourable weather conditions, only a very small quantity of seed was secured.

Red Clover.—In red clover, the breeding work has chiefly been confined to breeding, through mass-selection, of hardy strains. The results so far obtained not only show that it is practicable to develop varieties carrying hardiness as a hereditary varietal

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character, but they also indicate that it may be possible to increase the lasting ability of red clover by evolution of varieties of a perennial type. Special attention has been paid to this question during the last few years.

Grasses.—Since 1911, breeding work with timothy has steadily been progressing. Through repeated self-fertilization of selected individuals within a number of timothy families, a number of new varieties are being developed. Owing, however, to the fact that the plants from which selections first were made were of unknown, and, certainly, of hybrid origin, the breeding work is progressing rather slowly.

In 1912, a number of individual plants of western rye grass were singled out for breeding work. A few of the plants thus selected were used, the following year, as mother plants for new varieties. In the selection of the mother plants special attention was paid to those characters on which early and heavy hay crops of fine quality depend. The breeding work is progressing very satisfactorily and, in fact, at a quicker rate than that with timothy. In order to explain why distinct varieties of western rye grass appear to be comparatively easy to develop, it would be necessary to study in detail the natural propagation of the multitude of wild forms which constitute what is called western rye grass. Suffice it to say, in this connection, that automatic self-pollination has been observed in several wild varieties of western rye. These observations have been made in the Edmonton district, Alberta, where a very great number of varieties grow in the greatest profusion, and may explain, in part at least, why various forms of the western rye grass are comparatively constant, and therefore rather easy to fix by breeding as distinct varieties.

Some work with red top and meadow fescue was also conducted the last year, but, as this work is still in its infancy, no particular reference need be made to it.

Field roots.—With a view of developing improved varieties of field roots, selections were made of two varieties of mangels, and one variety each of swede turnips and carrots. As, however, the process of breeding field roots is of necessity rather slow, any statement as to any indications of the probable outcome would, at the present stage of the work, be premature.

HOME-GROWN VERSUS IMPORTED SEED.

Last year, the Division reported that seed of field roots, especially mangels and turnips, had been produced most successfully, during the year, on several of the Experimental Farms and Stations. Figures were quoted to the effect that experiments in field-root seed raising had given most satisfactory results in the provinces of Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia. Results obtained this year confirm the statement that root seed growing can be made a very profitable business in the Dominion.

Of special interest to the seed-buying farmer is the question whether field-root seed, grown in Canada, is capable of producing as valuable crops as imported seed. Up to the present, practically all the field-root seed used in the Dominion has been imported from European countries, and it is a rather widespread supposition that the European seed is superior to that raised this side of the Atlantic. It is often heard that the climate in the seed-raising countries in Europe is especially favourable to the production of high-class seed, and that, for this reason, Canada would not be able to compete with Europe as a root-seed-producing country.

In order to ascertain the truth of such assertions, *i.e.*, in order to ascertain the crop-producing ability of Canadian-grown seed in comparison with foreign-grown seed, a number of experiments were conducted by the Division of Forage Plants this year. Canadian-grown seed of a number of varieties of field roots was tested, side by side with the best commercial seed of the same varieties, at many of the Experimental Farms and Stations, and also on many private farms in Eastern Canada. Of special interest is the outcome of the experiments with Canadian-grown seed of Mammoth Long Red mangel, tested in comparison with commercial, imported seed.

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The Canadian-grown seed used in these experiments was raised at the Central Experimental Farm, Ottawa, from roots taken from the ordinary farm crop, practically without any selection at all. It was tested in comparison with commercial seed of the same variety. The crop realized from the Ottawa-grown seed was, on an average, over 10 per cent higher than the crop produced by the commercial seed.

Similar results were obtained in experiments with other varieties of mangels, and also with swede turnips, and under the circumstances the Division is in a position to report that Canadian-grown seed of varieties of field roots has proven, on the whole, superior to imported seed of the same varieties.

FORAGE CROP EXPERIMENTS IN THE YUKON TERRITORY.

In order to investigate the agricultural possibilities in the Yukon, especially in regard to production of forage crops, the Dominion Agrostologist was authorized to visit the Dawson district for about two weeks. The visit was prompted by the desire of the department to reduce, if possible, the extraordinarily high prices that must be paid for forage in the Yukon as long as it has to be imported from the outside. If it were possible to raise locally what feed is needed in the territory, many farm products would be available at vastly reduced prices. The successful growing of hay and fodder in general would also tend to lower the price for horse labour considerably.

At present the question of securing hay, for horse feed especially, is of primary importance. A certain quantity of wild hay is used for the purpose, but relying on wild hay is rather unsatisfactory. In the first place, it is not easily available in sufficient quantities and, furthermore, it is not, as a rule, rich enough for hard-working animals. Of special importance is therefore the question whether tame hay, such as timothy, western rye, clover, alfalfa, etc., can be grown successfully in the Yukon.

During the visit of the Dominion Agrostologist to Dawson, arrangements were made to start experiments with various forage plants immediately. It is most fortunate that the Experimental Farms in this work can count on the most whole-hearted and generous assistance from Yukon farmers. In this connection should be mentioned, especially, the name of Mr. J. W. Boyle, manager of the Canadian Klondike Mining Company, whose much-appreciated generosity permits us to start experiments on two locations in the Klondike valley at practically no expense to the department.

POULTRY DIVISION.

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.

The year 1916-17 has been most unusual both as regards production and marketing.

The spring of 1916 was late and conditions unfavourable for production, the early part of the summer cold and wet, the latter part hot and dry.

These conditions were anything but satisfactory for growing chickens. The late spring meant late hatches, the wet, cold weather in the early summer resulted in a heavy mortality, and the hot, dry period following materially retarded the growth of the pullets. When winter came, pullets, instead of being mature and ready to lay, did not commence laying until late in the winter or even towards the spring. Naturally this lessened the egg supply.

The high price of feed also had an influence on the available supply of eggs. The feed required for the chicks during the summer was unusually expensive, which no doubt militated against their growth. Because of the price of feed, many of the laying stock were sold in the fall, which again cut down the possible egg supply and for the same reason, the layers that were retained were not, in some cases, fed as well as they should have been.

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Taking, therefore, the backward spring and unfavourable summer combined with the high prices paid for feed, the result was that early winter eggs were extremely scarce, and the sale of layers in the fall, and the continued scarcity of feed meant that even later eggs were not as plentiful as usual. This will also explain the reason, from the producer's standpoint, why eggs were higher in price during the winter of 1916-17 than they have ever been in the history of Canada.

The high prices that prevailed for all foodstuffs naturally raised the price of eggs. Coupled with this was the export of eggs to Great Britain in 1915, which depleted Canada's supply for local demand. To provide for the shortage that existed, eggs were imported early in 1916 from the United States.

During the spring months of 1916 a few eggs were exported to Great Britain, but in the fall a considerable number were sent over, which left the Canadian warehouses comparatively bare, and the supply less than is usually the case. This, combined with the production difficulties and the fact that Canadians were eating more eggs than usual, made the egg more or less of a luxury during the winter of 1916-17.

FEEDS AND FEEDING.

Special attention has been given to experiments on the cost of feeds, cost of production, incubation, brooding, diseases, etc. Experiments along these lines have been conducted at the Central Farm plant and also, to a limited extent, at the various branch Farms.

The exceptional price of all feeds caused many to sell laying stock that should have been retained. For though the cost of production was considerably higher this year than last the product (eggs) was also higher.

To show that the price of feed is not the only factor to be considered the following table is given:—

TABLE showing greater profits over cost of feed for winter 1916-17 in comparison with the same pen in 1915-16

Year.	No. of eggs laid.	Average price per doz.	Total value of eggs.	Value of feed consumed.	Profit per pen. Labor not considered	Profit per hen.	Cost to produce 1 doz. eggs.	Average profit on 1 doz. eggs.
		cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	cts.	cts.
1915-16.....	4,766	39.6	157 33	58 42	98 91	0 99	15.0	24.6
1916-17.....	4,806	55.2	221 17	82 49	138 68	1 67	20.6	54.6

There was an average increase of 56.1 per cent in the price of the scratch feed for the six winter months of 1916-17, and an average increase of 36.8 per cent in the price of mash and an increase of 33.3 per cent in the price of green bone during the same period, but there was an average increase of 75 per cent in the price of eggs, leaving a substantial margin of profit.

It might also be noted here that at the end of April the Toronto quotations for feed were 54.1 per cent higher than the previous year, and eggs 66.6 per cent higher than at the same time in 1915-16.

The age of the layers is a vital factor in the cost of production, as the following table shows. This table gives a summary of average results at several Experimental

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Farms for the past three winters from records of many pens of pullets, yearlings, two-year-olds, and over:—

Age.	Number of birds.	Average weight per doz.	Average price per doz.	Total value of eggs.	Cost of 1 doz. eggs.
		ozs.	cts.	\$ cts.	cts.
Early pullets	292	23.2	43.2	451 73	18.3
Late pullets.....	152	22.7	43.1	221 88	56
Yearling hens	161	24.7	47	176 48	78 2
Two years old and over.....	79	24.2	44	13 94	\$5.73

It would appear from the above that there is considerable loss from late pullets the first winter, and from hens during their second-winter laying, though these prove profitable sometimes. It may be well to point out that some of the above records were obtained during December, January, and February only, a season of low production for hens, and that a number of hens on the Farms system are kept over their profitable period for special breeding purposes, and the egg yield from these would enter into and adversely influence the average.

For winter egg production the early hatched pullet is the most profitable, the yearling seldom as profitable, the late pullet and two-year-old and older hen a loss with but few exceptions.

ALTERATIONS TO CENTRAL FARM PLANT

During the year the central plant has been rearranged to make it more convenient for visitors to see the plant and stock without the danger of having the gates left open and experiments interfered with. A new entrance has been made from the front of the plant connected with a driveway which runs from one end of the plant to the other. This driveway enters at the back of the feed house and runs south parallel with Maple avenue until it reaches the horticultural ground, when it then turns on to Maple avenue. That part of the plant between these drives and Maple avenue is now divided into five yards, which are kept mowed the same as the lawn, and are used for rearing chicks.

The turkey plant has been fenced and two subways placed beneath the sidewalk. These subways connect the original plant with a portion of the forest belt that borders the north side of the Farm.

In order to assist in the turkey experiments, a small, rough farm of 30 acres was rented, upon which the range turkeys were reared. The young turkeys were placed there when out of the incubators, and left there until almost ready to market in the fall.

Houses.—A hot-water-pipe brooder house has been erected and is in use for the early spring chicks. This house was much needed for the early hatches, and, so far, is proving quite satisfactory.

Unfortunately, the waterfowl house on the duck plant was burned in the fall, which necessitated the transferring of the ducks and geese to the upper plant for the winter.

BRANCH FARMS.

The work at those branch Farms upon which poultry is kept has been made more efficient by the completion of most of the buildings and equipment, and the installing of a fuller stock of birds.

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STUDY OF DISEASES OF POULTRY.

Through the courtesy of Dr. Torrance, Veterinary Director General, Dr. A. B. Wickware, Assistant Biologist, has been assigned to poultry work. This makes it possible to carry on investigation in poultry diseases that up to this time was not possible.

EXTENSION WORK.

Even more than usual has been the demand this year for poultry lectures, judges, etc. Requests for such have been complied with whenever possible.

The survey work, started over a year ago, is proving of much benefit. It has been the means of improving, to no small extent, poultry conditions in the sections where the work has been conducted. New houses, improved stock, more sanitary conditions, and keener interest all through are apparent. During the year a second block of farmers in the province of Quebec has been selected. This block is in the vicinity of Ste. Anne de la Pocatière Experimental Station. Similar work to that which is carried on at Cap Rouge is being conducted there.

Through the Illustration Stations Division, eggs have been distributed to the farmers operating these farms. The Experimental Farms or Stations in the three provinces, where this illustration work is being conducted, supplied to each of the farms two settings of Barred Rock or White Wyandotte eggs. From these eggs very satisfactory reports have been received.

During the winter and spring there has been a heavier demand for poultry information, through correspondence and through visitors, than has been the case up to the present. This demand comes from all classes, both farmers and townspeople.

TOBACCO DIVISION.

REPORT OF THE TOBACCO HUSBANDMAN, F. CHARLAN.

The tobacco crop of Canada in 1916 gave one of the poorest harvests in this country for many years.

Speaking generally, the season was colder than that of 1915, which itself was regarded as a very unfavourable one.

The chief drawback in 1916 was the almost continual rainfall which, especially in Quebec, took place at the time of transplanting, and rendered impossible, in many cases, the proper preparation of the soil. This forced a number of growers to abandon, in whole or in part, their tobacco crop, although their operations in the seed-bed had been successful. As a rule, the heavy lands of the province of Quebec only produced about half a crop of tobacco.

In Ontario the situation was a little better, especially in the case of the bright flue-cured tobacco, the production of which rose to about a million pounds. This represents the largest harvest of bright tobacco ever obtained in Canada. While the production of bright tobacco increased considerably, that of white Burley decreased to about two million pounds, much below the average, which for some years has been between five and seven million pounds per annum.

The prices paid the growers in 1916 were relatively high, both for the Burleys in Ontario and for the Seed Leafs in Quebec. The exhaustion of tobacco stocks in the United States and resulting increases of prices in the American markets affected Canadian prices as well.

From the economic point of view, the small tobacco harvest of 1916 may have had advantageous results for Canadian growers, since the demand for native tobaccos, especially on the part of those who handle cigar tobaccos (binders and wrappers),

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was very active. This would indicate, to a certain extent, that an increasing number of Canadian manufacturers are endeavouring to use the native products in the place of those tobaccos formerly procured in other countries. When this habit has once been formed, and when the taste of the consumer has become accustomed to our native-grown tobacco, it should find on the Canadian market a regular demand. This is of special interest in the case of the Canadian fillers which, so far, have not been accepted freely by our manufacturers.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

Plantation.—Plantation operations on the Central Experimental Farm were finished in good time (about the 5th of June), but growth was very slow during the whole month. Most of the varieties tested did not reach their normal development. The tobacco was slower than usual in reaching maturity, having been kept back by the cold and wet period during the first half of September. However, a liberal supply of seed was obtained, of which most was distributed in the course of the past winter.

Special attention was devoted to the growing of certain tobaccos recently imported from the Philippine islands, as they may prove suitable for fillers. The first Canadian generation of one of these tobaccos, the "Espada," seems to have become acclimatized fairly well.

Fermentation.—This work was considerably reduced on account of the small quantity of tobacco delivered from the Experimental Station at Farnham, and especially on account of the feeble development of the leaves, which allowed us to mark only four cases of tobacco as of sufficient length to be classed as binders. These, with two cases of fillers, were subjected to forced fermentation in a hot, damp room. All other tobaccos were fermented together in one single bulk.

The latter was re-bulked twice. That in the centre of the pile, therefore, received three active fermentations. No damage was noticed, but a certain quantity of mucor developed on the driest leaves in spite of the fact that they were placed in the centre of the bulk.

EXPERIMENTAL STATION, ST. JACQUES L'ACHIGAN, QUE.

The seed-beds at St. Jacques l'Achigan were particularly successful, but a number of the plants were lost, as they could not be planted out when they were ready. The transplantation was postponed until the 15th of June and was then done by hand on account of the impossibility of getting on the land with machines. After an interval planting was again undertaken by machines and finished June 30, about fifteen days later than usual.

Experience has shown that, in a season like 1916, it is better, after a certain date, the 15th of June for example, to plant, no matter how unfavourable conditions may be, rather than wait longer. The best tobacco grown at St. Jacques was planted by hand when the land was too wet to use the planting machine. After planting, cultivation was a difficult matter, but a crop almost up to the average was obtained. A number of neighbouring tobacco growers, who waited until the beginning of July to plant, harvested only a very immature and poorly developed crop.

EXPERIMENTAL STATION, FARNHAM, QUE.

The tobacco plantation at Farnham suffered considerably from wet weather. The planting was late, first because the seedlings were not as good as usual, but especially because it had been impossible to get the land into good shape. The land remained wet all season, and it was impossible to get the tobacco as mature as usual before harvesting.

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Some binder tobacco was fairly successful, but the Marylands, and especially the Warne, a variety of bright tobacco which should be flue cured, were a complete failure. After the results from Warne in 1916 and those of preceding years, which were very unsatisfactory, it would seem clear that it is useless to attempt to grow this type of tobacco in the province of Quebec.

The curing process proceeded normally, without damage from fermentation.

EXPERIMENTAL STATION, HARROW, ONT.

In spite of the unfavourable conditions, the crop of White Burley at Harrow in 1916 was about normal, the colour being a little darker than usual. No definite results were obtained from the experimental work with fertilizers applied to White Burley. Better results were obtained in experimental work on the different plots of bright tobacco of the Virginia type.

On the whole, the tobacco root-rot caused less damage in Ontario in 1916 than in the present year. However, a larger number of cases of "mosaic" disease were reported. A considerable number of varieties of the Yellow Virginia type were tried at Harrow in 1915. Up to the present, the Warne has proved itself best adapted to the district, but, it may yet be found that, in a normal season, some other variety, especially if grown from Canadian seed, will prove superior for special uses.

The White Burleys grown in Ontario fall into two large classes—the Broad Leaf and the Stand-up Burley. Each of these classes comprises several varieties. Although the Stand-up Burley, on account of its earliness, furnishes a greater proportion of well-coloured leaves, most growers continue to prefer the Broad Leaf on account of its greater weight of crop.

STUDY OF TOBACCO SOILS.

This work began in 1916, and is making good progress. Some fifty samples of soils, mostly from Ontario, were collected. The analysis of these soils has been completed. From this work it is expected that it will be possible to make a rational classification of the tobacco soils of Canada. The question, however, is not a simple one, on account of the intermingling of various types of soil, often within a very limited area. In many cases, several types are found on the one farm, which makes it necessary for the Canadian grower to have a much more complete knowledge of tobacco soils than would be the case were the soil of a certain district almost uniform in character.

In certain cases, especially in the soils of Quebec, it has been possible to make close comparison between their physical composition and that of some well-known tobacco soils in the United States. It will be interesting to note the influence of the climate on the crop growing on these soils as compared with the different types of tobacco obtained in the United States on soils almost similar. It has been noted that filler tobaccos (Zimmer Spanish and Aurora) gave products of finer texture than those of similar tobacco grown in Ohio. Unfortunately, however, it is by no means certain that one can find in Canada very large areas of soil comparing with those on which binder tobaccos are produced in the United States.

The difference of texture noted between Canadian tobacco and similar varieties grown in Connecticut and Ohio will probably lead our tobacco manufacturers to adopt processes of fermentation somewhat different from those which obtain in the United States. At the present time good progress has been made in the study of this question.

INSPECTION WORK.

In the course of inspection work in Ontario in 1916, the officer in charge of the work visited about one thousand tobacco growers, and discussed with them the various tobacco problems met with. A record was also made of the area devoted to tobacco. The Tobacco Division was thus enabled to make a very close computation of the production of tobacco in Ontario.

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DISEASES OF TOBACCO, SELECTION, STUDY OF VARIETIES, ETC.

This work is carried on by Mr. G. C. Routt. A considerable quantity of material has been collected, and preliminary conclusions have already been drawn from the study of certain "sick" soils in Ontario, made in collaboration with Mr. Freeman. These conclusions will be tested as the work is extended over larger territories.

It seems certain that tobacco root-rot was especially prevalent on clayey soils in 1916. This confirms observations made in Connecticut in 1915. The season there had been wet, and while the lighter sandy soils absorbed the water readily, the heavier land became caked and impervious to moisture. The air supply of the tobacco roots was partly cut off favouring attacks of root-rot. This indicates the necessity of frequent cultivation in wet seasons, to keep the soil open and well aerated.

Although in many sickly tobacco plants examined the trouble did not appear to be caused by root-rot, it seemed only necessary to examine a plant, even of healthy appearance, to discover the bacteria of *Thielavia basicola*. This would seem to indicate its wide spread and the necessity of keeping the resisting powers of the tobacco plant as high as possible. As preventive measures, in addition to the disinfection of the seed beds, drainage, deep ploughing and frequent cultivation are recommended.

As to selection work and study of varieties of tobacco (the latter including cross-breeding and general research work), it may be said that, in North America at least, this line of investigation has only begun. Under Canadian climatic conditions, one cannot expect from an imported variety the same product which it furnished in its native country. In the process of acclimatization, its character changes, either for the better or the worse. It is necessary, therefore, to fix certain types at the point where they are best suited to Canadian market demands, and, afterward, to endeavour to keep them at this point.

DIVISION OF ECONOMIC FIBRE PRODUCTION.

REPORT OF G. G. BRAMHILL, OFFICER-IN-CHARGE.

During the past year a new division was organized in connection with the Experimental Farms Branch, known as the Division of Economic Fibre Production. This division has to do with the investigation of economic fibre plants in Canada, but more especially was established to study the problems connected with flax-fibre production.

At one time the growing of flax was an industry of considerable importance in western Canada, almost every little village having its flax mill. Owing to the scarcity and high price of labour, which was not compensated for by the introduction of labour-saving machinery, flax fibre could not be produced in Canada to compete with that imported from Russia. As a result, the industry declined until, in 1914, there were less than 2,000 acres devoted to this crop. The cutting off of European supplies has changed the whole situation, and flax for fibre once more looms up as an important crop in Canadian agricultural development.

There has been established on the Central Farm at Ottawa a small, but complete, experimental flax mill. It is equipped with the most up-to-date machinery available in the flax trade, and every facility provided for a thorough study of flax retting and manipulation. The practical work is being carried out by a Belgian who has had more than twenty years' experience in flax growing, retting, and manufacturing in the famous Courtrai region of Belgium.

Experiments are under way to determine what areas in Canada are suitable to flax-fibre culture; what fertilizers can be economically applied to flax; the extent to which flax reduces the fertility of the soil; what amount of seed to sow per acre; the proper stage to harvest flax; what varieties give best results; and the efficiency and

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practicability of water-retting as compared with dew retting, under Canadian conditions. Details of the experiments are not available for this report, but it is hoped the results will be ready for publication another year.

In the meantime, a considerable effort is being made to foster flax growing in those sections of Canada where the industry is already established. Meetings have been held in flax-producing centres to impress farmers with the importance of increasing the flax acreage. Owners of flax mills have been called together in convention, and ideas exchanged as to how the quality of Canadian flax may be improved. Special inducement has been given to the development of flax-pulling machinery, and every reasonable means employed to encourage the production of flax in Canada.

Attention has also been given to the possibility of utilizing the fibre from the waste flax straw of the prairies. A number of uses have been found for this material, but none has been tested out on a commercial scale in Canada. The transportation costs involved in gathering a sufficient quantity of flax straw together at one point to warrant the establishment of paper or fibre-board mills is one of the greatest difficulties connected with a solution of this problem.

The culture of hemp for fibre has also been taken up. To what extent hemp can be economically grown in Canada has not been established, but that an excellent quality of hemp fibre can be grown in many sections has been demonstrated. The experiments in connection with this plant are being watched with interest.

DIVISION OF ILLUSTRATION STATIONS.

REPORT OF JOHN FIXTER, SUPERVISOR.

This being the second season during which the Illustration Stations have been in operation in the provinces of Alberta and Saskatchewan, results of the work carried on are now noticeable, particularly in the production of good seed. A few notes are given on the work at each Station during 1916.

ILLUSTRATION STATIONS IN SASKATCHEWAN.

Assiniboia.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Percy J. H. Warren, and is situated in the southeast quarter of section 24, township 8, range 1, west of the 3rd meridian, half a mile from the town of Assiniboia, Sask.

Owing to the heavy snowfall of the winter of 1915-16, and the frequent showers in the spring, work on the land was delayed until late in April. The seed, however, was sown the first week in May, and made a very rapid, strong growth until about August 1, when rust set in and lessened both quality and quantity about 35 per cent. It is, however, gratifying to note that the well-selected seed, which had a good strong germ and was sown on well-prepared land, withstood the rust much better than many grain fields sown with ordinary seed and with ordinary cultivation. In fact, many of the latter were scarcely worth cutting.

Corn sown in June on this Station was destroyed by gophers, and was ploughed under. Western rye grass, sown June 15, made a uniform growth but, it being the first season, no crop was harvested.

Alfalfa, sown June 15, made a rather uneven growth on account of heavy rains which washed some of the plants out, necessitating the re-seeding of the spaces.

Biggar.—The farm at this point on which the illustration fields are located is owned and operated by Dr. S. E. Shaw, and is situated in the southeast quarter of section 32, township 35, range 14, west of the 3rd meridian, at the junction of two well-travelled roads, and facing the Grand Trunk railway.

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The area selected in the autumn of 1915 had grown different kinds of crops. In order to have uniformity, all of the area was summer-fallowed in 1916, to be cropped as directed in 1917.

The cost per acre for summer-fallowing was \$4.70.

Cabri.—The farm at this point on which the illustration fields are located is owned and operated by Mr. F. W. Abraham, and is situated in the northeast quarter of section 19, township 19, range 18, west of the 3rd meridian, one mile from the town of Cabri, Sask.

The land on this station was perfectly prepared.

The grain crops, being sown in good condition, made splendid growth up to August 17, when a hail-storm did considerable damage. However, they recovered considerably from this shock but were visited by a second hail-storm, causing altogether a loss of about 75 per cent. While great damage was done to each of the rotations, it is quite noticeable that the fields which received an extra amount of cultivation show increased yields per acre.

Forage crops on this farm have done excellently. Mr. Abraham was much interested in the production of pure seed, and harvested 1,519 pounds of clean seed from 2 acres of western rye grass, the fodder from which was readily eaten by the live stock. Corn made a good growth and, had the season been favourable, some of it would have ripened. Alfalfa also made an excellent growth. The first crop was harvested for fodder; the second was left for seed but, owing to the unfavourable weather, no seed was harvested, but there was a good crop of fodder.

All the seed grown on this Station which could be spared in the autumn of 1915 was sold for seed.

Herbert.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Milton Holmes, and is situated in the northwest quarter of section 18, township 17, range 9, west of the 3rd meridian, bordering a well-travelled road, and one-half mile west of Herbert, Sask.

The soil on the different rotation fields was thoroughly prepared before seeding.

Wheat sown in April and oats sown in May made a very strong, uniform growth up to about August 10, when rust appeared and damaged the crop fully 20 per cent. Frost on the night of August 10 did considerable damage, as well, to the quality and quantity of the grain crop. Hail also struck this section again on August 18 and did about 15 per cent damage.

Corn sown in May made a very poor, weak growth, and was not harvested.

Alfalfa and western rye grass gave good yields. The fodder was well cured, and eaten quite readily by horses and cattle.

The grain grown on the illustration fields was thoroughly screened and, the germinating power being high, it was sold for seed, eleven farmers in the district purchasing.

Kindersley.—The farm at this point on which the illustration fields are located is owned by the Ottawa Farm Development Company, and is operated by Halpenny Bros. for the company. It is situated in the northwest quarter of section 9, township 26, range 22, west of the 3rd meridian, adjoining a public road and quite close to the proposed Canadian Northern station.

The soil on this station is a heavy clay loam. Owing to the late spring, and on account of wet and cold weather, the grain was not sown until May. However, a good seed-bed was made and the wheat and oats made a very strong, uniform growth, until August 10, when a heavy frost struck this section. Rust also appeared about August 1, and continued until harvest. It is estimated that fully 75 per cent damage was done to the crop.

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Alfalfa sown in 1915 gave a very heavy crop of excellent fodder.

Western rye grass was one of the heaviest crops seen in Saskatchewan. Had it been weighed it would not have been much short of 4 tons per acre.

Corn did not do well on account of the late, cold spring. It was badly frosted.

The wheat on this farm up to the time of being cut by frost and hail promised at least 50 bushels per acre, and the oats 100 bushels per acre.

Lloydminster.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Hugh Hill, and is situated in the southwest quarter of section 11, township 50, range 28, west of the 3rd meridian, one-half of a mile north of the town.

The area selected on this farm had been cropped several years, and was summer-fallowed in 1915. The grain was sown on a well-prepared seed bed and made a good, uniform growth up to August 10, when a heavy frost struck this section. Rust also appeared and continued until harvest. The grain crop was injured fully 75 per cent, making the grain useless for seed purposes. Fresh seed grain will be supplied this station.

Alfalfa and western rye grass sown in June made an excellent, strong growth before winter set in.

Maple Creek.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Geo. Hammond, and is situated in the southwest quarter of section 12, township 11, range 26, west of the 3rd meridian, one mile east of the town of Maple Creek, Sask.

The area selected for this station is a sandy loam, and, having been cropped several seasons, the rotations were all started in 1915 and crops harvested in 1916.

Wheat and oats were both sown about April 15, and made fairly uniform growth until harvested. There was, however, considerable difference in the yields per acre. Wheat grown after wheat yielded 31 bushels per acre, costing 37.3 cents per bushel; and wheat grown after summer fallow yielded 42 bushels per acre, costing 42½ cents per bushel. Oats yielded 84 bushels per acre, which cost 20.3 cents per bushel to produce.

Corn, sown in June, made a rapid growth to a height of from 5 to 6 feet.

Alfalfa, harvested in July and October, gave two good crops, and seed was harvested from the second crop.

Western rye grass was harvested and gave 2½ tons per acre. It was well cured for fodder and winter feeding.

The wheat and oats grown on this station were shown at some of the leading grain shows, and were prize winners in all cases.

Moosejaw.—The farm at this point on which the illustration fields are located is owned and operated by Mr. John Glassford, and is situated in the southeast quarter of section 12, township 17, range 27, west of the 2nd meridian, 2 miles west of the town of Moosejaw, and borders a well-travelled road, and can be seen from the railway.

The area selected at this station had been cropped several years previous to starting the illustration work, but, unfortunately, wild oats had a very strong hold on the land. The rotation commenced on this farm was the same as on the others, but has now to be changed in order to eradicate the wild oats. It is intended to cultivate one of the fields thoroughly until August 10, then plough from 7 to 8 inches deep, pack, and sow to fall rye, at the rate of 14 bushels per acre, allow the rye to ripen the following season and harvest for grain crop.

As soon as the above crop is removed, the land is to be cultivated thoroughly until the last week in August, then ploughed and packed thoroughly and again sown to fall rye, at the rate of 1 bushel per acre. Should any trace of wild oats be found then it will be summer-fallowed the third season.

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A second field, summer-fallowed in 1916, is to be sown with oats and harvested early for fodder, then cultivated the balance of the season. If wild oats should still appear, a second crop of fodder will be taken off and the land summer fallowed the third season.

Corn on this station has done exceptionally well, giving a large quantity of choice fodder for winter feeding. Alfalfa and rye grass sown in June made a very strong, uniform growth before winter set in.

Pambrum.—The farm at this point on which the illustration fields are located is owned and operated by Mr. C. W. Appelgren, and is situated in the north half of section 21, township 11, range 11, west of the 3rd meridian, a half mile south of the town of Pambrum.

The area selected for illustration purposes, with the exception of field "A," was summer-fallowed in 1915. The fallow was perfectly worked and put in good condition for sowing in 1916. The spring opened fairly early and, the land being perfectly prepared, the grain was sown on a good seed-bed. Wheat and oats made a rapid, uniform growth, but were struck hard by rust, which caused about 40 per cent damage. Frost also injured both quality and quantity. A noticeable feature on this station is that wheat grown continuously yielded only 18 bushels per acre, while that grown after summer-fallow gave a yield of 36 bushels, just double the quantity. Oats also gave a good yield. Both wheat and oats made choice seed, and a considerable part was sold for that purpose. Corn sown in June did well, and gave a heavy crop of fodder.

Alfalfa and western rye grass, sown June 9, made a very strong, uniform growth, were clipped and left as a mulch, a good strong growth being left as a protection over winter.

Prelate.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Wm. Huxtable, and is situated in the southwest quarter of section 15, township 22, range 25, west of the 3rd meridian, one mile north of the town of Prelate.

The area selected for this station was practically new land, being a good, strong, chocolate loam, rather heavy in character. The land was all summer-fallowed in 1914 and in good condition for starting the rotations in 1915. This being the second year, the rotations show a remarkable difference in the yields.

Wheat after wheat gave a yield of 20 bushels per acre, costing 49 cents per bushel, while wheat after summer-fallow yielded 40 bushels per acre, costing 38½ cents per bushel, which charge includes the previous summer-fallow, rent and machinery. The 20 bushels per acre costing 49 cents per bushel would amount to \$9.80. If sold at \$1.50 per bushel the amount would be \$30, leaving a balance of \$20.20. The 40 bushels per acre costing about 39½ cents per bushel, if sold at \$1.50 per bushel, would amount to \$60, leaving a balance of \$44.60. It is here shown that it pays to summer-fallow, and the land is kept much freer from weeds by so doing.

Alfalfa and western rye grass gave good crops of excellent fodder.

Radville.—The farm at this point on which the illustration fields are located is situated in the southeast quarter of section 18, township 6, range 17, west of the 2nd meridian, bordering the main highway and adjoining the town of Radville.

The area selected on this farm is located on what is known as the burned-out lands. As part was cropped in 1915, it had to be summer-fallowed in 1916 in order to arrange the rotations for 1917. The soil on this station is rather uneven on account of large holes where the humus has disappeared. Several seasons must elapse before this land is uniform, unless a great deal of time and labour is spent levelling and cultivating.

Wheat and oats sown in April made a medium growth and promised to yield fair crops up to July 25, when rust set in until harvest. Hail also visited this station on

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August 11, doing about 50 per cent damage. The grain on this farm also appeared to withstand the rust and storms, on account of the stronger growth, more than many fields in the neighbourhood, and at threshing time farmers purchased for seed purposes all that was left after the operator had saved enough for his own seed.

Shaunavon.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Neil McLean, and is situated in the northeast quarter of section 18, township 8, range 18, west of the 3rd meridian, adjoining the town of Shaunavon.

The season of 1916 opened fairly early, the land being thoroughly prepared.

Wheat sown in April and oats early in May both made a very rapid, strong growth until the night of August 10, when 4 degrees of frost occurred in the district, doing a great deal of damage, both to quality and quantity of all grain crops.

The wheat on this station stood from 3½ to 4 feet high and promised from 40 to 50 bushels per acre. The oats stood 4 feet high and promised at least 100 bushels per acre. It is gratifying to note that the injury was not as great on the station fields as on those in the district. The selected grain sown on well-prepared soil appeared to ripen more uniformly and to be nearer maturity when the frost came.

Corn also made a satisfactory growth, but was cut down completely by the frost.

Alfalfa and western rye grass, sown in June, made a very strong, uniform growth and were in excellent condition when winter set in. This being the first season, no crop was harvested.

Weyburn.—The farm at this point on which the illustration fields are located is owned by Mr. E. Meredith, and is situated in the southeast quarter of section 6, township 9, range 14, west of the 2nd meridian, 3 miles north of the town on the junction of two well-travelled roads.

The area chosen on this farm had been cropped several seasons, and was summer fallowed in 1915. Owing to the great depth of snow during the winter of 1915-16 and the heavy rainfall in the spring of 1916, the land could not be worked as early as desirable. However, a good seed bed was prepared and the seed well sown early in May. Fine growing weather set in, and a very strong, uniform growth was made. The wheat crop promised 40 to 50 bushels per acre, and the oats at least 100 bushels per acre. Unfortunately, rust appeared in this section about July 25, and frost August 10, lessening the yields from 40 to 50 per cent, and injuring the quality for seed purposes.

Corn and roots on this farm did exceptionally well.

Western rye grass sown the last of May, and alfalfa sown in June made very strong, uniform growth, and promise to give big yields.

Mangels were also sown, and gave a very heavy crop of choice roots for winter feeding.

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Bow Island.—The farm at this point on which the illustration fields are located is owned and operated by Mr. M. Mortensen, and is situated in the northeast quarter of section 2, township 10, range 11, west of the 4th meridian. It is about four and a half miles south of the town, and borders the main road.

The land for the different rotations on this station was well prepared, and the seed sown early in April. Growing conditions were as good as could be desired. Both wheat and oats made a rapid, strong growth until harvested. One noticeable feature in the rotations is on the field sown to wheat continuously, which gave a yield of 27 bushels per acre, costing 41 cents per bushel, while wheat grown after summer-fallow yielded 48 bushels per acre, costing 36 cents. Oats yielded 89 bushels per acre, and the cost of production per bushel was 18 cents.

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Corn sown in May grew to a height of 5 feet, but no cobs formed.

Alfalfa and western rye grass, sown in June, made a uniform growth, were clipped and left on the land as a mulch.

Carmangay.—The farm at this point on which the illustration fields are located is owned and operated by Mr. J. A. Neilson, and is situated in the southwest quarter of section 14, range 23, township 14, west of the 4th meridian, 2 miles east of the town of Carmangay.

The area chosen at this station is a sandy soil, and has been cropped several seasons.

The field of wheat sown continuously shows a marked decrease over the summer-fallow field, yielding less than half. It may be advisable to change this rotation for two reasons, on account of weeds increasing and because of the decrease in yields.

Oats made a medium growth. There was a slight attack of rust, about 2 per cent, and frost also did about 5 per cent damage.

Corn made a medium growth, but no cobs formed.

Alfalfa and western rye grass, sown in June, made a uniform growth and promised to give good crops next season.

Empress.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Frank Barry, and is situated in the northeast quarter of section 28, township 22, range 1, west of the 4th meridian, five and one-half miles south of the town of Empress.

The area selected on this farm was in prairie sod in 1915, and was well worked for cropping in 1916.

Wheat was sown in April, and made an excellent growth until harvested, yielding as high as 55 bushels per acre.

Oats were an exceptionally heavy crop, standing over 5 feet high, and yielding 132 bushels per acre.

The grain took first prize at the local exhibition, and all that could be spared was sold for seed in the neighbourhood.

Corn sown in May made a strong, even growth, standing $5\frac{1}{2}$ to 6 feet high.

Alfalfa and western rye grass, sown in June, made a very strong growth, and was clipped and harvested, yielding about 8 tons of fodder. A good second growth was made and left for protection over winter.

Foremost.—The farm at this point on which the illustration fields are located is owned and operated by Mr. T. H. Frankish, and is situated in the southwest quarter of section 4, township 6, range 11, west of the 4th meridian. It borders a well-travelled road connecting Foremost and Avalon, and is about two miles from the town of Foremost.

The area selected at this station is practically new land, being a good, strong chocolate loam. A summer-fallow having been well worked in 1914, the rotations were all started in 1915.

Wheat continuously shows a marked decrease this season, yielding 33 bushels per acre and costing 35 cents per bushel, while the alternate wheat and summer-fallow rotation yielded 54 bushels per acre, costing 34 cents per bushel. Wheat in the three-year rotation yielded 50 bushels per acre, costing 30 cents per bushel.

Oats made a very uniform, strong growth, yielding 85 bushels per acre, costing 16 cents per bushel.

Corn, sown in May, grew to $4\frac{1}{2}$ feet high, but no cobs formed.

Alfalfa and western rye grass both gave average yields and made excellent fodder for both summer and winter feeding.

The grain grown on this farm was an exceptionally fine sample and was selected for seed and also for exhibition purposes.

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Grassy Lake.—The farm at this point on which the illustration fields are located is owned by Mr. F. N. Perry, and is situated in the southeast quarter of section 15, township 10, range 13, west of the 4th meridian, adjoining the town of Grassy Lake.

The grain on this farm made a fairly strong growth until late in August, when a heavy storm crossed this section, flattening down some of the fields, lessening the yields 30 per cent, and making harvesting very difficult.

Alfalfa sown in July also suffered by washing-out, and will have to be re-sown.

Western rye grass sown in July made a uniform growth, but no crop was harvested the first season.

Corn made a growth of from 6 to 7 feet in height, and some cobs were beginning to form.

High River.—The farm at this point on which the illustration fields are located is owned and operated by Mr. B. F. Kiser, and is situated in the southeast quarter of section 5, township 19, range 28, west of the 4th meridian, adjoining the east side of the town.

The area selected for this station had been cropped several years previous to selection for illustration purposes. It was summer-fallowed in 1915 and cropped in 1916. Owing to considerable volunteer grain growing on the area, particularly wild oats, it may be best to change the rotation another season to eradicate the wild oats.

Wheat sown in April and oats sown in May made only a medium growth until harvested. Frost injured these crops, doing about 5 per cent damage.

Corn made a uniform growth, and grew about 5 feet high. No cobs formed, however. It was injured by frost about 50 per cent before being harvested.

Alfalfa and western rye grass sown in July made a uniform growth, but this being the first season, no crop was harvested, and a good, heavy growth was left for a winter covering.

Jenner.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Jerry Fisher, and is situated in the west half of section 2, township 21, range 9, west of the 4th meridian, 1 mile east of the town of Jenner, and bordering a well-travelled road.

The area selected for this station was in prairie sod in 1915. It was well broken and back-set and thoroughly prepared for cropping in 1916.

Wheat and oats, sown early, made a good strong growth until August 10, when rust and frost lessened the yields about 20 per cent. However, fairly good crops were harvested, and all the surplus grain was sold for seed purposes.

Western rye grass sown in May, and alfalfa sown in June, made a strong, uniform growth, but no crop was harvested the first season.

Macleod.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Norman Grier, and is situated in section 33, township 9, range 26, west of the 4th meridian, about six miles from Macleod, and bordering a well-travelled road leading to Calgary.

The area chosen for illustration work was in prairie sod in 1915, was well broken and backset and thoroughly prepared for the different rotations in 1916. The season opened early and the grain was sown in good condition. Both wheat and oats made a rapid growth and were the first grains ready to cut in the district, escaping both frost and rust. The illustration fields became so noticeable that the operator had requests for large quantities of seed before the grain was cut.

Corn did exceptionally well on this station, growing to a height of 6 feet.

Alfalfa and western rye grass, sown in June, made a strong, uniform growth, but no crop was harvested the first season. A good covering was left for protection over winter.

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Magrath.—The farm at this point on which the illustration fields are located is owned and operated by Mr. J. A. Meldrum, and is situated in the northeast quarter of section 11, township 5, range 22, west of the 4th meridian, 3 miles south of the town of Magrath.

This being the second season, the rotations have been established and a marked difference is noticeable in the yields.

Wheat continuously gave a yield of 36 bushels per acre, while wheat after summer-fallow alternately gave 54 bushels per acre, wheat in the 3-year rotation gave 59 bushels per acre, and wheat after corn 51 bushels per acre.

The oats also gave a heavy yield. All the grain grown on this station would make excellent seed.

Corn, sown in June, made a strong, uniform growth to a height of 6 feet. Some cobs formed, but did not fill.

Alfalfa and western rye grass both gave good crops of fodder and were harvested in good condition.

Manyberries.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Matti Mickelson, and is situated in the northeast quarter of section 25, township 5, range 6, west of the 4th meridian, one mile from Manyberries and about forty miles from Seven Persons railway station.

The season opened up rather late in this section.

Both wheat and oats were sown in May. This is the second season that grain has been grown on this station, and a marked difference is shown in the yields. The wheat on the continuous field gave a yield of 27 bushels per acre, at a cost of 40 cents per bushel, while that grown after summer-fallow yielded 48 bushels per acre, at a cost of 36 cents per bushel.

Corn, sown in May, made a medium growth and was tasseled, but no cobs formed.

Alfalfa and western rye grass, sown in July, made a uniform growth, but this being the first season, no crop was harvested.

Milk River.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Wm. Kinder, and is situated in the southwest quarter of section 30, township 2, range 15, west of the 4th meridian, three and a half miles east of the town of Milk River.

The area selected for illustration work was in prairie sod in 1915. All had to be broken and thoroughly prepared for seeding in 1916.

Wheat, sown early in April, made an exceptionally rapid growth until harvested. Very slight traces of rust were noticed, but did no damage. The crop yielded 54 to 61 bushels per acre. Banner oats yielded 86 bushels per acre.

Corn sown in May made a uniform growth, height about 5 feet, with cobs beginning to form.

Alfalfa and western rye grass made a strong, uniform growth, were clipped during the season and left on the surface as a mulch. A good growth was also left standing as a protection over winter.

Munson.—The farm at this point on which the illustration fields are located is owned and operated by Mr. R. R. Fraser, and is situated in the northeast quarter of section 3, township 30, range 20, west of the 4th meridian, 2 miles southeast of the town. It is on a well-travelled road, and can be seen from the town.

This being the first season this station has been in operation, all of the land except field "A" was summer-fallowed.

Wheat, sown on field "A" made a fair growth up until July, when visited by a hail-storm doing about 5 per cent damage. On August 10 and September 14, frost did between 50 and 60 per cent injury to the crop. The grain harvested was so shrunken that it was useless for seed.

The balance of the land was summer-fallowed, costing \$5.97 cents per acre.

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Medicine Hat.—The farm at this point on which the illustration fields are located is owned and operated by Mr. E. J. Hunt, and is situated in the east half of section 12, township 13, range 5, west of the 4th meridian, about six miles north of the town, and bordering a well-travelled road.

Both wheat and oats were sown in good time and made a uniform growth. This being the second season, a marked difference is shown in the yields on the rotations. Wheat on the continuous cropping yielded 26 bushels per acre; on the two-year rotation after fallow, 44 bushels per acre; on the three-year rotation, 42 bushels per acre; and after corn, 37 bushels per acre, proving altogether to be a choice sample.

Pincher Creek.—The farm at this point on which the illustration fields are located is owned and operated by Messrs. Sandgren and Carlson, and is situated in section 15, township 6, range 20, west of the 4th meridian, 2 miles west of the town of Pincher Creek.

The area on this station was summer-fallowed in 1915 and cropped as directed in 1916.

The land was thoroughly prepared and the grain sown in good condition.

Wheat and oats made a strong, uniform growth until July 1, when a hailstorm visited this section, doing considerable damage. The grain crop recovered some up to August 11, when a frost reduced the quality, making it useless for seed.

Corn, sown in May, was badly frozen, and had to be ploughed under.

Alfalfa and western rye grass made a strong, uniform growth, and were clipped during the summer and left as a mulch.

Whitla.—The farm at this point on which the illustration fields are located is owned and operated by Mr. R. H. Babe, and is situated in section 8, township 11, range 8, west of the 4th meridian, adjacent to the town of Whitla.

The area selected was in prairie sod; in 1915 it was ploughed and thoroughly prepared for cropping in 1916. Wheat and oats sown about the middle of April made a strong, rapid growth until harvested. There was no injury by rust, smut, or hail to any of the crops on this station. The grain was harvested in good condition, and was a choice sample for seed purposes. Wheat yielded from 41 to 46 bushels per acre, costing 41 cents per bushel to produce; and the oats, 112 bushels per acre, costing 14.8 cents per bushel to produce. Alfalfa and western rye grass made a strong, uniform growth, were clipped during the season and left on the land as a mulch. A good, strong growth was left standing as a protection over winter.

ILLUSTRATION STATIONS IN QUEBEC.

Aubrey.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Samuel Reddick, and is situated in the county of Chateauguay, on the main travelled road between Chrysostome village and Aubrey station. The land in this section is mostly all level and of a heavy sandy loam, with a good deal of clay underlaid with a clay subsoil.

The work during the season has been preparatory for a four-year rotation, to be as follows:—

One-quarter in hoed crops, chiefly corn and roots;

One-quarter in grain and seeded with clovers and timothy;

One-quarter in clover hay, two crops the same season, whenever possible;

One-quarter in hay or pasture.

This rotation will be adopted on all the stations in Québec.

Owing to the cropping system previously carried on, this season's work has been mostly preparatory for the rotation. The heavy snowfall during the winter, and frequent heavy showers in spring-time, kept the land very wet and delayed seeding operations.

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Drummondville.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Amedee Marier, and is situated in the county of Drummond, on the main road between Drummondville and St. Germain. The land is a heavy, sandy loam with a clay subsoil, typical of a large area.

This farm, and many others in the district, would be greatly improved by tile drainage. Frequent showers during the whole season kept the land so wet that it was almost impossible to get the crops sown, and after sowing most of the crops were drowned out. In the autumn, good, large water furrows were made to carry off the surplus water. Many continuous crops of hay had been grown on this land, and it will take another season to get a four-year rotation established.

Lac à la Tortue.—The farm at this point on which the illustration fields are located is owned and operated by Mr. S. T. Lupien, and is situated in the county of Champlain, on the leading road adjoining the town of Lac à la Tortue. The land is a very light and sandy subsoil, with but little humus on the surface. A regular four-year rotation is being carried on, besides five one-acre fields being sown with different leguminous crops with the object of adding humus to the soil. This being the first season, most of the work was preparatory.

Nomining.—The farm at this point on which the illustration fields are located is owned and operated by Mr. E. Lamoureux, and is situated in the county of Labelle, on one of the leading roads adjoining the town of Nomining. The land is a very light, sandy loam, almost void of humus. Most of this area had been in hay and required ploughing and thorough cultivating before a rotation could be established. It is proposed to start a four-year rotation on this farm.

The spring of 1916 opened up fairly early; crops of all kinds made a good growth up to about July, when it became very dry, lessening the yields per acre.

New Carlisle.—The farm at this point on which the illustration fields are located is owned and operated by Mr. E. M. Legallais, and is situated in the county of Bonaventure, on the main road between Paspébiac West, about two miles from the town of New Carlisle. The land is a red, sandy loam, rather poor in quality. Weeds have got well established, particularly the sow-thistle. Thorough cultivation will have to be adopted to eradicate the weeds, and a short rotation, along with barnyard manure and heavy seeding of clover, to bring up the humus in the soil. Several kinds of crop had been grown on this land the previous year, and during the season of 1916 most of the work was preparatory in order to arrange for a systematic four-year rotation.

The growing season opened up early and crops got a good start, but were afterwards checked by drought.

Rimouski.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Nazaire Begin, and is situated in the county of Rimouski, about one mile from the town of Rimouski. The soil is a light, sandy loam, with a streak of peaty soil in the four-year field. The subsoil is a hard clay mixed with stone, and in some places the shale rock comes quite close to the surface.

The past season has been more of a preparatory one, arranging to establish both a three-year and a four-year rotation.

The spring opened up fairly early, and good growing weather prevailed until about August, when it became rather dry for the balance of the season.

Stanbridge East.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Chas. S. Moore, and is situated in the county of Missisquoi, on the main road leading to Bedford, and adjoining the town of Stanbridge East. The soil is a heavy, sandy loam, with a sandy and stony subsoil. The surface is rolling and full of moisture. Two rotations of four-year duration are to be established on this station, one on tile-drained land, the other on undrained

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land adjoining. The work on this station this season was mostly preparatory, however. Clover, wherever sown, made a very strong growth. Heavy rains delayed spring work, and had this land not been tile-drained, some of it would not have been sown until very late.

St. Gédéon.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Wilfrid Simard and is situated in the county of Lake St. John, on a well-travelled road leading to the railway station. The soil is a heavy, sandy loam, well supplied with vegetable matter, underlaid with a clay subsoil.

Two rotations are planned for this station, one of three-year duration, as follows:—

1st Year.—Hoed crops and manured.

2nd Year.—Grain seeded with timothy and clovers.

3rd Year.—Clover hay, two cuts if possible.

A four-year rotation is also to be established as on the Aubrey station.

Owing to several kinds of crop being grown on this land for a number of years, most of the work the past season was preparatory.

St. Isidore.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Adelard Bilodeau, and is situated in the county of Dorchester, adjoining one of the leading gravel roads, about one mile from the village of St. Isidore.

The soil is a heavy, sandy loam, mixed with clay underlaid with a clay subsoil. This station would be greatly improved by tile drainage.

Owing to the frequent heavy rains and consequent wet condition of the soil, spring work was very much delayed.

This being the first year, the work on this station has been preparatory for a four-year rotation.

Tile drainage would improve conditions on this property. There is also a very large area in the neighbourhood which would be greatly improved if the land were tile-drained.

Ste. Julie de Verchères.—The farm at this point on which the illustration fields are located is owned and operated by Mr. Adolphe Hebert, and is situated in the county of Verchères, adjoining the village of Ste. Julie, in a fairly thickly-populated district.

The soil is a heavy loam, with considerable clay and a clay subsoil. The land on this station is fairly level, being similar to a very large section of the neighbourhood. The work on the station during the season was preparatory for a four-year rotation.

The work on the illustration stations is attracting the attention of farmers more each year.

The strong, uniform growth, the early and even ripening qualities of the grain fields, with the attractive appearance of the forage crops, make farmers inquire as to varieties of grain, fodder crops, cultivation, and the system of rotation carried on.

It is gratifying to note that so many farmers are availing themselves of the opportunity of purchasing for seed the well-graded grain grown on the stations.

DIVISION OF EXTENSION AND PUBLICITY.

REPORT OF W. A. LANG, OFFICER-IN-CHARGE.

The work of this division was continued during the year along the lines indicated in previous reports, namely:—

- (1) The display at fairs and exhibitions of an Experimental Farms exhibit.
- (2) The issuing and distribution of Exhibition circulars. Forty new circulars were brought out during the year.
- (3) The enlarging of the mailing lists. The total number of names on the departmental lists was increased by about 42,250 names during the year.
- (4) The supervision of the preparation of "Seasonable Hints." Nos. 4, 5, and 6 were distributed during the year to the mailing list, and 60,000 copies of each issue were sent to 3,000 branches of the principal Canadian banks.
- (5) The issuing of press articles. Some forty-five of these were sent out, during the year, to the agricultural press.

In the exhibition work, the plan followed was to make each branch Farm and Station a centre from which an exhibit was sent out over a circuit of fairs in the district. One hundred and thirty-two fairs were covered from the branch Farms in this way, and thirty by exhibits sent out from the Central Farm at Ottawa.

The exhibits sent out, while attractively arranged and staged, were primarily of an educative character. Every effort was made, not only to interest the visitor in the exhibit itself, but to bring to his attention the work of the Experimental Farms system, and its efforts to aid the farmer. The exhibition work is evidently appreciated by the fair authorities and by the public, as is shown by the increased number of requests for the Experimental Farms exhibit.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

THE SEASON.

The winter of 1915-16 was mild and open, with brief periods of cold weather near the middle of both January and February. March had an extraordinary snowfall of 66 inches. It was stormy and wintry, with a mean temperature almost as low as that of the previous months. The snow went away gradually in April. Spring work commenced on May 8, with the first seeding at the Station on May 13. The weather continued so favourable that seeding operations were completed almost two weeks earlier than for several years. June and July were good growing months. August was dry, and an average hay crop was saved, almost without damage from rain. Grain, potatoes, and roots gave full crops, and a greater proportion than usual of garden corn and tomatoes ripened. Fruit gave a well-coloured, medium crop. The autumn pastures remained good, and the live stock were in excellent condition when housed. Fall ploughing, though delayed by the dry weather of September, was generally completed before winter. The winter months were favourable for getting work done, and March, 1917, has been exceptionally fine.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature, Fahrenheit.				Precipitation.				Bright Sun- shine. Hours.	
	Maximum.		Minimum.		Rainfall.		Snowfall.			Total.
	Date.	Deg.	Date.	Deg.	Days.	In.	Days.	In.		In.
1916.										
April.....	26	55	4	24	8	2.38	4	9	3.28	164.2
May.....	25 & 26	65	2	30	11	2.08	.....	.....	2.08	209.4
June.....	28	76	2	38	14	2.74	.....	.....	2.74	202.7
July.....	21	86	6 & 18	48	15	4.14	.....	.....	4.14	233.4
August.....	18	81	2	42	10	1.79	.....	.....	1.79	251.7
September.....	1 & 2	79	20	39	9	2.02	.....	.....	2.02	188.6
October.....	1	78	19	28	13	4.22	.....	.....	4.22	120
November.....	9	55	27	10	8	2.29	6	14.5	3.74	88.2
December.....	13	50	29	1	14	3.4	9	11.5	4.55	32.7
1917.										
January.....	12	43	26	—21	5	1.98	12	21.5	4.13	114.8
February.....	10	45	3 & 4	—16	4	2.52	11	14.3	3.95	128.4
March.....	27	51	5 & 6	4	6	1.29	3	13	2.59	178.2
Total annual.....	.....	.....	.....	.....	117	30.85	45	83.8	39.23	1,912.3

LIVE STOCK.

Horses.—There are now on the Station three teams of draught horses and two colts, one of the teams being pure-bred Clydesdale mares. The number of hours horse labour for the year totals 13,330. Valuing hay at \$10 per ton, oats at \$40 per ton, oil cake at \$40, bran at \$25, and roots at \$4, the horses cost 43¼ cents per day at heavy work. The average cost of feed per day for a 5-year-old colt was 15½ cents.

Dairy Cattle.—No dairy herd has yet been established at this Station, two Ayrshire cows only being kept this year. During the winter the following daily rations were fed: Dry cow, 1 pound bran, 50 pounds turnips, 18 pounds mixed hay; cow yielding 17 pounds milk daily, oats 3 pounds, bran 3 pounds, oil cake 1 pound, turnips 50 pounds, mixed hay 18 pounds; cow yielding 40 pounds milk daily, cottonseed meal 1 pound, oats 5 pounds, bran 5 pounds, oil cake 2 pounds, turnips 50 pounds, mixed hay 18 pounds. One cow in a lactation period of 384 days gave 8,263 pounds milk, and the other 7,026 pounds in a period of 334 days. The profit on cow No. 1 between calvings amounted to \$112.63, and on cow No. 2, \$92.23. These records surpass those of the previous year.

Steers.—Twenty steers were purchased in the autumn, and turned into good pasture adjoining a field of rape, to which they had access. They were dehorned before stabling, and all the steers made good gains during the following week. The average cost of the steers, including feed up to the time the experiments were started, was \$6.67 per hundred pounds live weight. The total weight of the five pens at the start was 9 tons and 20 pounds. The weight at the time of the sale, after a sixteen-hour fast, was 11 tons, 979 pounds, or a gain of 2 tons 959 pounds. The average price realized at the auction was \$10.55 per hundredweight. The average profit, after adding the total cost of feed, etc., at current prices to the value of the cattle on November 1, was \$31.09 per steer. These gains were made in 135 days. The following comparisons were made:—

Beef versus Dairy Steers.—Pen I, Shorthorn steers under 2 years old, were compared with dairy grade steers in pen II, that were about 80 pounds heavier per head at the start.

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These two pens were fed as nearly alike as possible. The amount fed each pen on the days mentioned, which are taken at random during the period, shows the method of feeding which was used, namely, an abundance of succulent feed, and a gradual increase in the grain fed from the start. On November 17, each steer's share of the feed was 18½ pounds of corn stover that had been run through a cutting box and allowed to warm, 60 pounds turnips, 8½ pounds hay, 1 pound crushed oats and barley, and one-quarter pound bran. On January 1, each steer was fed 40 pounds mangels, 10 pounds hay, 3¾ pounds crushed grain, and 2½ pounds bran. The dairy steers gained 728 pounds, while the Shorthorn steers gained 1,048 pounds, or 320 pounds more, on the same feed.

Heavy feeding of Roots throughout the period versus gradually decreasing the Roots fed from the start to the finish.—Pen II were fed as described above. Pen V were fed as follows: They were started the same as the others, and on November 17 were getting the same feed. On January 1, they got 45 pounds roots, 11½ pounds hay, 2½ pounds crushed grain, and 2 pounds bran. On February 10, they were fed 30 pounds roots, 12½ pounds hay, 3¾ pounds crushed grain, and 3 pounds bran. Pen II gained, as already stated, 728 pounds, pen V gained 1,195 pounds, or 467 pounds more in 135 days.

Lambs.—Thirty lambs were purchased in November at 9½ cents per pound live weight. Experiments with different roughages were conducted. The lambs were sold at auction March 15, 1917, and brought 14½ cents per pound. The average profit per lamb, over the first cost, after deducting the value of two lambs lost, and the cost of the feed at current prices, was \$2.84.

POULTRY.

The housing equipment consists of one permanent house 16 by 32, for 100 hens, three colony houses 10 by 12, and three colony houses 8 by 12, along with a number of small rearing coops.

The birds kept are the Barred Plymouth Rock and the White Leghorn, there being 74 of the former and 125 of the latter on hand at the close of the year.

A large number of eggs were sold for hatching purposes, and three incubators were run at the Station poultry plant. These were compared with natural incubation. From the incubators 61.7 per cent of fertile eggs hatched; under the hens, 77 per cent.

One shipment of day-old chicks was made to Murray River, reaching its destination in good shape.

The 73 Rock hens laid 120½ dozen eggs, and the 125 White Leghorn hens 316 dozen, from January 1 to March 31, 1917.

BEES.

The bees were prevented from swarming during the summer. They produced a good crop of honey, and one strong colony was wintered in the new bee cellar. It has come through in good condition.

FIELD HUSBANDRY.

Rotations.—The following rotations are being tested at the Charlottetown Station: Rotation "A" (five years' duration)—First year, hoed crop; second year, grain seeded down; third year, clover hay; fourth year, timothy hay or pasture; fifth year, grain seeded down, clover ploughed under in autumn, and light dressing manure applied.

The land under this rotation provides a large quantity per acre of food suitable for live stock.

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Rotation "B" (five years)—First year, hoed crop; second year, grain seeded down; third year, clover hay, ploughed in autumn; fourth year, grain seeded down; fifth year, clover hay or pasture, top-dressed and ploughed in autumn. This rotation is similar to "A," but is planned to control perennial weeds.

Rotation "C" (four years), suitable for a stock farm—First year, hoed crop; second year, grain seeded down; third year, clover hay; fourth year, timothy hay or pasture. Manured in fall and ploughed for roots.

Rotation "D" (three years), suitable for stock farm with abundant rough pasture—First year, hoed crop; second, grain; third, clover hay, manure and plough in fall.

Rotation "G" (seven years)—First year, oats, seeded down; second year, hoed crop; third year, grain; fourth year, clover hay; fifth year, timothy hay; sixth and seventh years, pasture. This long rotation is thought to check or destroy diseases affecting hoed crops, and has been very generally followed on the island.

Crop Yields.—The average yields per acre on the Experimental Farm rotations were: Wheat—Four fields gave an average yield of 25 bushels and 3 pounds. The yield was greatly reduced by two blights, one a *fusarium* and the other *cladosporium*, which did much injury to the wheat crop throughout the province. Barley—"Charlottetown No. 80," a deciduous-awned variety, produced 49 bushels and 7 pounds of barley on rotation A1, which has an area of 1 acre. Hay—The average yield from twelve fields of hay was 2 tons, 227 pounds per acre. Mangels—The average yield from three fields of mangels was 82 bushels and 21 pounds per acre. Oats—The average yield from three fields of Banner oats was 64 bushels and 4 pounds. A hot, dry period, just when the grain was filling, greatly reduced the yield of the earliest sown oats. Potatoes—A small field of Irish Cobblers gave a yield at the rate of 247 bushels per acre. One acre of Green Mountains gave a yield of 297 bushels.

Cultural Experiments.—In 1916 an area was laid off into 440 plots of one-fortieth acre each for the purpose of cultural investigation work along the following lines:—

No.	Experiment to determine best—	Plots.	Rotation.	Total plots.
1	Rates of seeding clover and timothy.....	9	4 years	36
2	Method of applying barnyard manure.....	9	4 "	36
3	Method of after-harvest cultivation of sod land for grain.....	9	5 "	45
4	Method of seeding nurse crop for yield of hay.....	5	4 "	20
5	Method of seed-bed preparation.....	11	3 "	33
6	Rates of seeding nurse crop of oats.....	4	4 "	16
7	Depths of ploughing sod for roots.....	6	4 "	24
8	Depths of ploughing sod for grain.....	6	5 "	30
9	Rates of seeding nurse crop of barley.....	4	4 "	16
10	Method of treating neglected land.....	8		8
11	Depths for underdrainage.....	21	4 "	84
12	Depths of seeding cereals.....	4	4 "	16

Averages covering a period of years will, of course, be necessary before any reliable conclusions can be drawn.

FERTILIZER EXPERIMENTS.

The investigational work with fertilizers was continued. One experiment is to determine the quantities and proportionate composition of a fertilizer which will yield the greatest profits. Results so far would seem to indicate that phosphoric acid

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is the most important fertilizer constituent. A second experiment endeavours to ascertain the relative efficiency of different sources of nitrogen and phosphoric acid. This year's results showed that nitrate of soda was the best source for nitrogen, and a combination of acid phosphate and basic slag the best source for phosphoric acid. An experiment to determine the value of fertilizer prepared from seaweed was also carried on.

CEREALS.

In the uniform test plots of cereals, ten varieties of wheat were tried, with yields of from 42 bushels 26 pounds to 25 bushels 24 pounds per acre; fifteen varieties of oats, yielding from 93 bushels 20 pounds to 65 bushels 12 pounds per acre; fourteen varieties of barley yielding from 85 bushels 26 pounds to 32 bushels 45 pounds; and four varieties of peas with yields from 19 bushels 34 pounds to 16 bushels 49 pounds per acre.

The best strains of registered seed were again multiplied on the regular rotation area.

Co-Operative Test of Oats.—The five-year co-operative test of the three leading varieties of oats commonly grown in the province was completed. The average yield per acre from fifty plots of each, as tested on the ten farms, was as follows:—

Banner.. . . .	62 bushels 8 pounds.
Old Island Black.. . . .	56 " 6 "
Ligowo.. . . .	55 " 8 "

FORAGE CROPS.

Thirteen varieties of Indian corn were tested on 1/100 acre plots. The seed was soaked in arsenate of lead before planting, which prevented any injury from birds. The yields ranged from 7 tons to 13 tons 450 pounds per acre. The crop was shocked and allowed to dry out for corn stover. Before feeding it was run through a cutting box and allowed to warm slightly in the pile. The cattle then ate it with relish.

In field roots, twenty-four varieties of turnips, sixteen of mangels, six sorts of carrots, and four of sugar beets were tested. The turnips were badly injured by the white grub or larvæ of the June bug, the rust fly attacked the carrots, and some general injury was done by cutworms. The yield of turnips was from 24 tons 1,000 pounds to 15 tons 1,500 pounds per acre; mangels, from 21 tons 1,550 pounds to 14 tons 1,950 pounds; carrots, from 13 tons 950 pounds to 7 tons 950 pounds; and sugar beets, from 15 tons 1,000 pounds to 12 tons per acre.

In clovers and grasses the late spring snowstorms protected the former, but the backward spring weather retarded growth. The crop was, however, an average one. Four plots of alfalfa yielded from 2 tons 550 pounds to 2 tons 1,500 pounds per acre.

HORTICULTURE.

Orchards.—The young orchards of apple, plum, and cherry trees made a fair growth during the season, and bore a light crop of fruit. The young pear orchard that was moved the previous winter suffered but very slightly from the transplanting, and grew well. The old apple orchard gave a good crop of clean fruit.

Small Fruits.—The small fruits gave good returns, except the currants, which were apparently injured by frost at flowering time, and later by stem borers.

Vegetables.—Variety tests and cultural experiments were conducted with all the leading vegetables. The season was a most favourable one.

Lawn Trees, Shrubs, and Flowers.—The numerous trees and shrubs on the lawns and along the railway front made good growth during the season, and are very attrac-

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tive. The annual and perennial flowers, including the water-lilies and iris about the lily-pond, add greatly to the appearance of the Station, and attract many visitors during the summer.

BUILDINGS.

Two small houses were built for rearing chickens during the summer. The Station buildings are all in good condition.

ADDITIONAL LAND.

Five acres of land fronting on the Mount Edward road were leased for ten years from Judge Fitzgerald, with an option of purchase any time during the period.

SALE OF SEED GRAIN, AND DISTRIBUTION OF SEED POTATOES.

The many reports received from those who purchased registered grain from the Experimental Station, in the spring of 1916, are most favourable, and demonstrate conclusively that the growing of the most productive strains pays well. This was particularly true in connection with Charlottetown No. 80 barley, a two-row variety that drops most of its awns in the field. One of our prominent C.S.G.A. members wrote: "This is a farmer's barley."

EXHIBITIONS.

Many features were added to the Station exhibits, which made them outstanding in the buildings at the provincial exhibition at Charlottetown, and at the county exhibitions at Summerside and Georgetown. A special exhibit was sent to Souris. A very fine floral exhibit with special poultry and sheep husbandry features, was set up at the annual flower show of the Prince Edward Island Floral Association, August 30 and 31, 1916. The superintendent judged at the various exhibitions, at the Kinkora School Fair, and at the principal seed fairs held in the province.

SHORT COURSES AND AGRICULTURAL MEETINGS.

The superintendent gave a course of lectures on "Field Crops, Tillage, and the Judging of Cereals" at a series of short courses held during the winter months, at the following centres throughout the province: Glenwood, Bridgetown, Mount Herbert, Vernon River, Tracadie, Bonshaw, Mount Stewart, Montague, and Kensington. Much interest was taken by these communities, and many letters indicate that these courses are a connecting link between the Experimental Station and the farmers of the province. The superintendent gave lectures on horticultural subjects, in Prince of Wales College, to the six short courses in domestic science held during the winter; and also gave demonstrations to the boys of the college on splices, knots, and the making of rope halters. The judges of the Standing Fields Competition for the province held a field conference with the superintendent in August at the Station.

The superintendent was elected chairman of the Committee on Production for the National Service League of Prince Edward Island, and assisted in organizing the labour and resources of the province to produce maximum war supplies for the coming year.

FARMERS' PICNICS, VISITORS.

The farmers' picnics were again a great success. Many of the farmers' institutes arranged to come to the Station on the same day. The number of visitors recorded during the year was 6,203.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

The weather during April was exceptionally dry, and some of the land was ready to be worked on the 24th; and, as May was an ideal spring month, farming operations were well advanced when that month closed. Heavy precipitation in June, when rain fell on eighteen days, made spraying difficult, and also resulted in poor weed control. Favourable weather in July allowed the hay crop to be harvested in good condition. Unusually bright weather in August was well suited to the completion of the hay harvest, but potatoes and roots suffered greatly. No frost was experienced in September, and continued warm weather in this month made harvesting conditions excellent. October was rainy, but potatoes, roots, apples, and vegetables were harvested in good condition. The early part of November was exceptionally cold, but the weather opened up a little after the 24th, thus allowing the turnip crop to be harvested and much fall ploughing done. December was not a severe month, and the mean average temperature for January was the lowest it has been for the last three years. February was about normal, and March was ideal.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest	Lowest	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
1916.	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April.....	39.81	57	21	1.85	4.9	2.34	1.32	139.9
May.....	49.07	70	29	1.78	0.0	1.78	0.45	186.8
June.....	58.3	79	37	3.69	0.0	3.69	1.45	160.5
July.....	66.04	88	41	2.66	0.0	2.66	0.88	205.7
August.....	64.9	87	42	0.86	0.0	0.86	0.49	221.2
September.....	58.93	84	33	1.74	0.0	1.74	0.57	174.6
October.....	48.97	76	24	5.38	0.0	5.38	1.30	166.0
November.....	37.5	64	3	2.18	13	3.48	1.05	103.7
December.....	27.83	48	2	3.15	13.5	4.50	0.80	50.6
1917.								
January.....	18.85	45	-15	2.33	16.0	3.93	1.20	84.2
February.....	18.335	49	-7	2.59	11	3.69	0.78	95.5
March.....	28.525	57	9	1.56	14.5	3.01	1.2	166.3
Total annual				29.77	72.9	37.06		1,760.0

LIVE STOCK.

Horses.—Nine, including seven heavy and two lighter horses, are kept. Records were kept of the cost of feeding heavy horses in summer and in winter, and also of the cost of winter-feeding idle horses. The average cost of feeding heavy horses in winter was found to be 33.6 cents per day, and in summer 45.9 cents per day, while the idle horses, receiving no grain, were carried through the winter at a cost of 12.2 cents a day.

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Cattle.—There are twenty-nine head of registered Shorthorn stock on hand. Eleven registered bull calves were sold during the year. Six of these were yearlings and five were sold when between 3 and 6 months old. Eight of the cows are in the Record of Performance test. The herd has made very satisfactory returns during the year, and the heifers raised give promise of being good producers. Twenty-four steers were purchased in the fall and put on a feeding test. They were dehorned in November and divided into two uniform lots of twelve each. Lot 1 was fed 60 pounds of swede turnips each per day for the first three weeks, 55 pounds each per day for the next four weeks, and 50 pounds each per day for the balance of the feeding period. Lot 2 was fed 50 pounds each per day of corn ensilage for the first three weeks, 45 pounds each per day for the next four weeks, and 40 pounds each per day for the balance of the feeding period. Both lots were fed the same amount of a meal mixture composed of 200 pounds crushed oats, 200 pounds bran, 200 pounds cottonseed meal, and 100 pounds corn meal, and 10 pounds of hay each per day.

The results showed that the steers fed on turnips made an average gain of 286.16 pounds in 136 days, or 2.10 pounds per day, at a cost of 10.73 cents per pound gain. The average increase in value per steer in this lot was \$52.95 for the feeding period, and the profit per steer \$22.23.

The steers in the other lot, fed corn ensilage as a succulent, made an average gain of 304.5 pounds in 136 days, or 2.24 pounds per day, at a cost of 10.36 cents per pound gain. The average increase in value per steer in this lot was \$54.71 for the feeding period, and the profit per steer \$23.14.

To sum up, the steers fed corn ensilage as a succulent made greater gains at less cost, and were consequently sold at a greater profit, than those fed turnips.

A comparison was made between the best six and the poorest six in each lot. The best twelve steers were sold at an average profit of \$26.36, and the poorest twelve at an average profit of \$19.02, a difference of \$7.34.

A comparison was also made between the gains during the first and second halves of the feeding period. The steers in the two lots made average gains of 185 pounds and 201 pounds, respectively, in the first half, and 101 pounds and 103 pounds in the second half, of the feeding period.

A record has been kept of the cost of raising a grade steer, and this record shows that the cost of feed for the first year was \$40.23, and for the next 330 days, \$37.54. The value of the steer at the end of that time was \$104.50.

POULTRY.

Three breeds of poultry were carried during the year, namely, Barred Plymouth Rocks, Rhode Island Reds, and White Wyandottes, a total of 238 birds. These are accommodated in two permanent houses, seven colony houses, and two brooder houses.

Three makes of incubator were tested, and out of 2,450 eggs set, 973 chickens were hatched. Of the different breeds, 22.8 per cent of the White Wyandotte eggs were hatched, 45.8 per cent of the Plymouth Rocks, and 52.2 per cent of the Rhode Island Reds. Artificial incubation and natural incubation were compared, 309 eggs being set under twenty-two hens; 17.5 per cent of these proved infertile, and of the remainder, 65.2 per cent were hatched. By artificial incubation, 47.4 per cent of the fertile eggs were hatched.

The total number of chickens hatched was 1,064. Some 300 succumbed to an attack of pneumonia when quite young, but the remainder were raised with little loss.

The winter grain ration for laying hens was made up of equal parts of oats and cracked corn, except in November, when wheat also formed part of the ration. In ad-

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dition to the above, a dry mash was always before the hens in hoppers. The cost to produce a dozen eggs during the winter months ranged, in the different pens, between 23 cents and 61 cents.

Forty-five birds were crate-fed for two weeks at a cost of \$9.67. Each bird increased in value during that period 31 cents, the increase in weight per bird being 1.15 pounds.

Ten capons were fed from November 1 to February 15, being crate fed for the last two weeks. The increase in value over cost of feed for the first four months of the feeding period was 21 cents per bird, and for the last two weeks 8 cents, making a total profit for the whole period of 29 cents per bird.

BEES.

Of the fourteen colonies wintered outside in 1915-16, only ten survived, owing to the fact that some of the colonies were weak, and the weather in February and March was unusually severe. The total production of honey for the season was small, only 24 pounds being extracted. Only one swarm was produced, and in the fall, the eleven colonies were reduced to eight by uniting some of the weaker ones.

FIELD HUSBANDRY.

Rotations.—No crop rotations have yet been started at this Station, but, as clearing proceeds, it is hoped that land may become available for this work.

Crop yields—Eight acres of Longfellow corn produced a crop of 99 tons 1,837 pounds. Other small areas brought the total ensilage crop to 165 tons 1,898 pounds. Two acres used in the fertilizer experiment were sown to Victory oats, and yielded from 52 bushels to 59 bushels 9 pounds per acre. Three acres of Banner oats gave an average yield of 41 bushels 11 pounds per acre. The seven acres of dyked marsh was sown to oats, seeded down with 8 pounds timothy, 8 pounds red clover, and 2 pounds alsike per acre. The whole area yielded 333½ bushels of oats. The total oat yield was 1,127.4 bushels. Ten acres of hay yielded at the rate of 2 tons 865 pounds per acre. Besides these crops, 32.4 bushels wheat, 31.7 bushels oats, 27.8 bushels peas, and 7 bushels vetch were grown.

FERTILIZER EXPERIMENTS.

Fifteen acres were utilized for the purpose of carrying on investigational work with fertilizers. An experiment to determine the quantity and proportionate composition of a fertilizer which will yield the greatest profit was continued for the second year on a three-year rotation. Another experiment would seem to show, so far, that nitrate of soda is slightly more effective than sulphate of ammonia as a source of nitrogen, and that acid phosphate is the best source of phosphoric acid. Other experiments compare the value of dog-fish scrap, nitrate of soda, and sulphate of ammonia as sources of nitrogen, endeavour to determine the influence of ground limestone in addition to various fertilizers, and the value of manure. The experiment with sea-weed fertilizer was also continued.

CEREALS.

The cereal work is carried on on land broken from green stumps in 1913-14. Three varieties of barley, two of wheat, three of oats, and two of field peas were tested in half-acre plots. Marquis wheat yielded 18 bushels 27 pounds per acre, and Red Fife 17 bushels 36 pounds per acre. Of the three varieties of barley, Charlottetown No. 80 gave higher yields than Manchurian or Canadian Thorpe, the crop being at the rate of 29 bushels 16 pounds per acre. Victory was the best variety of oats, yielding

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32 bushels 4 pounds per acre, and Arthur proved superior to Golden Vine peas, yielding 34 bushels 23 pounds per acre. A comparison was made between White Vetch and Black Vetch for seed. The White Vetch was a week earlier, and gave a better yield than the Black.

FORAGE PLANTS.

The land used for the variety tests of roots and corn was in potatoes in 1915. In the spring of 1916, stable manure was applied at the rate of 15 tons per acre, and after the land had been ploughed and disced, 1,000 pounds basic slag per acre was applied and disced in. A fertilizer containing 4 per cent nitrogen and ten per cent phosphoric acid was then applied at the rate of 500 pounds per acre, and the land again harrowed and smoothed.

Indian Corn.—Sixteen varieties of ensilage corn were tested, Essex Dent giving the highest yield, 16 tons 1,200 pounds per acre.

Roots.—Twenty-one varieties of swede turnips and twenty-three varieties of mangels were planted. The turnips varied in yield from 15 tons 100 pounds to 32 tons 700 pounds per acre and the mangels from 14 tons 700 pounds to 25 tons per acre. Of the six varieties of carrots, Improved Short White gave the highest yield, 22 tons 1,650 pounds per acre, and sugar beet seed of Italian origin gave greater returns than Ontario grown or German seed.

Grasses and Clovers.—Six one-twentieth acre plots of Grimm's alfalfa gave a total yield of 8 tons 310 pounds. The results with alfalfa this year would seem to indicate that this crop can be profitably grown by giving good conditions for starting the plants, and using sufficient limestone to correct soil acidity and supply the lime required for the crop. Various kinds of grasses were tested, and turnips, mangels, and carrots were grown for seed.

HORTICULTURE.

Fruits.—The total area in orchard fruits is 46.7 acres. The land, however, actually occupied by the trees is only one-sixth of the above area, as the space not occupied by the growing trees is devoted to other crops. During the past season a space of 3 feet each side of the trees was kept cultivated and free from weeds. The land outside of this was devoted to other crops. Turnips were grown in the peach and cherry orchard, peas in the plum orchard, clover and grain in the main commercial orchard, and potatoes in the orchard where fertilizer experiments are being conducted. The vegetable crops were also grown in the orchard area. By following this system, vigorous growth is maintained in the orchard trees and all available land, other than that actually required by the trees, is used to produce maximum crops.

The total orchard fruits planted are as follows:—

	Varieties.	Number of Trees
Apples.	227	2,616
Plums.	92	367
Cherries.	54	154
Peaches.	47	106
Pears.	55	223
Apricots and quince.	12	23
Total.	487	3,489

Work was continued at the orchards located at Falmouth, Berwick, and Bridgetown. Through the experiments being conducted at these orchards, much information of permanent value is being secured.

Vegetables.—A number of variety tests were conducted with different kinds of vegetables and other experiments to determine the best cultural methods for vegetables

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were carried on. The season was particularly suitable for tomatoes and corn, which made an excellent showing.

The potato work was confined to variety and cultural tests, and the yield per acre ranged in the varieties from 302 bushels to 117 bushels per acre. The Green Mountain strains ranged in yield from 313 to 180½ bushels per acre, a difference of 132½ bushels, all grown under similar conditions. Seventeen lots of Irish Cobbler ranged from 235 bushels to 93 bushels per acre, a difference in favour of the best yielding of 142 bushels per acre. Seed secured in 1916 from fifteen growers of Garnet Chili yielded from 278 to 158 bushels per acre, a difference of 120 bushels per acre. The Garnet Chili seed secured in 1915 and again planted in 1916 gave crops from 212 to 63 bushels per acre, a difference of 144 bushels per acre.

Ornamental Gardening.—Approximately 18 acres at the front of the farm are more or less given up to grounds and buildings. Part of this area is in old apple trees which are growing promiscuously, and the ground is not cultivated around them. These trees have produced some very satisfactory fruit. The grounds outside of this are in lawns and ornamental shrubs, trees, and flowers. The land along the front of the farm is very sandy, consequently the plants growing on these areas suffer very much during dry periods. The lawns during the summer time become brown, and are not as attractive as they otherwise would be. The past season, except during the latter part of August, was exceptionally favourable, and the lawns retained their green for the greater part of the season. The shrubs and trees are making excellent growth, and all annual and perennial flowering plants made an excellent showing.

FARM IMPROVEMENTS.

Buildings.—One poultry house for 100 hens was constructed during the year, and a shed-roof building 16 feet by 40 feet was erected for the wintering of idle horses and steers. Owing to the addition of an extra pair of horses, the stable in the horse barn would not accommodate them, making the erection of this building necessary.

Clearing Land.—Fifteen acres of additional land were broken up during the season, making in all 127 acres cleared since the farm started in 1911, as set forth in the following table.

The expenses in connection with the clearing of the 15 acres amounted to \$3,475.45, or \$231.69 per acre:—

	Acres.
New land broken to the end of 1912.. . . .	55
“ “ in the year of 1913.. . . .	17
“ “ “ “ 1914.. . . .	20
“ “ “ “ 1915.. . . .	20
“ “ “ “ 1916.. . . .	15
<hr/>	
“ Total new land broken.. . . .	127
Land still available for clearing.. . . .	10
Front area devoted to buildings and grounds.. . . .	13
Area devoted to poultry.. . . .	2
Area for picnic grounds, etc..	2
Dyked area.. . . .	9
Marsh pasture area.. . . .	3
Ravine pasture.. . . .	5
Area in ravine which is too rough for clearing.. . . .	125
<hr/>	
Total.. . . .	301

Roads and Bridges.—New roads were built at the rear of the farm, making a satisfactory automobile road to the rear fields. These roads were built of field

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stone, covered with earth. The carriage road running through the lower part of the ravine was also improved, and four bridges crossing the brook at different places constructed, making a fairly satisfactory carriage drive.

Overflow Water.—The catch basins put in last season have materially lessened the erosion usually caused by heavy rains and spring floods. By continuing this work it is hoped the usual damage from water will be overcome.

Underdraining.—It has not been possible to do much underdraining, although several of the fields at the rear of the farm will require that this be done. One drain of 1,000 feet of 4-inch tile was put through an area in one of the fields at the rear, and several smaller drains, totalling about 500 feet, were put in in another field. Owing to there being many boulders in the soil, underdraining in these fields is very difficult.

EXHIBITIONS.

Exhibitions were attended at Bridgewater, Yarmouth, and Shelburne, where displays illustrating the work being done by the Experimental Farms' system were arranged. These exhibitions were well attended, and much information given to visitors as to the nature of the work being done.

AGRICULTURAL MEETINGS.

In addition to attending meetings of the Fruit Growers' Association and Farmers' Association of Nova Scotia, most of the winter months were taken up in attending and addressing meetings in the counties of Kings, Hants, Digby, and Annapolis. The short courses at Truro and Lawrencetown were attended, and addresses given.

EXCURSIONS.

A large farmers' picnic from the country bordering on the Dominion Atlantic railway was held during July, and many smaller excursions and picnics were held during the season.

In order to give every facility possible for visitors, ample picnic grounds, with tables and a house for heating water, have been provided.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

THE SEASON, 1916-17.

During the first part of the winter of 1915-16 the weather was unsettled. The ground remained bare until well on in January. A heavy snowfall was experienced during the latter part of January, February and March, thus providing a protective covering for all crops at the period when most required. The snow disappeared gradually, preventing any excessive washing or flooding of the ploughed fields. Because of light rains and high temperature during April and May, farming operations were started some thirteen days earlier than in the previous season. This was a great help to the farmers, as there was much ploughing to be done, since the exceptionally wet fall of 1915 prevented as much work being accomplished along these lines as usual.

Most grain was seeded by the end of May. Vegetation made fair growth. June was less favourable for planting, having eleven rainy days recording a total precipita-

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tion of 4.74 inches. Excessive moisture in the soil during this period retarded the growth of grain; barley suffered the most. July and August were good growing months, and all crops made excellent progress. Hay was stored in first-class condition, and ideal harvest weather continued during September. The season was exceptionally good for the growth of corn; better than for some seasons past. The temperature was low and the precipitation heavy for October. The rain was beneficial in softening the ground for ploughing operations. November was unfavourable for the harvesting of roots; many experienced much difficulty in getting them stored in good condition. December and January were mild, with light flurries of snow towards the end of the latter month. Heavy snowfalls were experienced in February and March.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature.		Precipitation.			Total Sunshine.
	Highest	Lowest	Rainfall.	Snowfall.	Total.	
	°	°	Inches.	Inches.	Inches.	Hours.
1916.						
April.....	57	24	1.63	5.00	2.13	142.60
May.....	70	26	2.42	.....	2.42	186.20
June.....	77	32	4.74	.....	4.74	180.50
July.....	85	39	2.60	.....	2.60	217.30
August.....	85	37	1.70	.....	1.70	247.30
September.....	80	31	1.64	.....	1.64	170.80
October.....	75	20	5.55	.....	5.55	132.80
November.....	60	3	1.22	11.00	2.32	96.80
December.....	55	2	2.71	12.00	3.91	61.60
1917.						
January.....	45	-23	1.68	17.00	3.38	98.70
February.....	41	-16	1.44	14.00	2.84	122.00
March.....	56	- 7	0.90	12.00	2.10	166.30
Total for year.....			28.23	71.00	35.33	1,822.90

LIVE STOCK.

Horses.—Thirteen horses are kept on the Nappan Farm at present, made up of ten heavy draught, including four pure-bred Clydesdale mares, and three lighter horses suitable for express, cultivating, light harrowing, etc.

Experimental work has been commenced on the feeding of horses, while on light and on heavy work, and when idle. Data are also being gathered on the cost of raising colts.

Dairy Cattle.—The “grading-up” experiment has now completed its fifth year. The object of the work is to show the value of using a pure-bred sire on the average dairy stock of the country. The work so far has given satisfactory results, but has not yet been continued long enough for definite conclusions to be drawn, and the low percentage of heifer calves dropped thus far has been a drawback. The great advantage, if not necessity, of the proper and liberal feeding of dairy cattle has been very clearly brought out in connection with this experiment.

Beef Cattle.—Owing to the general decrease in production and finishing of good beef cattle, the work in this line was increased at the Experimental Farm this year.

Thirty-four steers, well-bred Shorthorns of beef type, were purchased locally in November, 1916, at \$6.65 a hundred pounds. They were sold on March 27, 1917, at

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\$10 a hundred. The average profit per steer for the eighty-eight days' test was \$36.14; average weight at beginning, 1,052.7 pounds; at finish, 1,221.6 pounds; an average increase of 168.9 pounds.

The plan of experiment and the comparative results obtained are shown in the following table, in which is a summary of eight lots fed, giving the main points of interest for comparison:—

	How Housed							
	Steers tied in barn.			Steers loose in box stall in barn.			Open Shed.	
	Feed.			Feed.			Feed.	
	Lot 1	Lot 2	Lot 3	Lot 5	Lot 4	Lot 6	Lot 7	Lot 8
	Roots and meal.	Roots, ensilage and meal.	Ensilage and meal.	Roots and meal.	Roots, ensilage and meal.	Ensilage and meal.	Oats, meal in mixture	Corn, meal in mixture
Number of steers.....	4	2	2	2	4	2	9	9
Average weight of steer at start.lb.	1,253	1,176	1,202	1,068	1,090	1,012	928	1,016
Daily rate of gain per steer.....lb.	1.96	1.46	1.56	1.61	1.84	1.64	1.90	2.158
Cost of one pound gain.....cents	9.37	12.59	11.77	11.34	9.96	11.10	9.44	8.51
Cost of feed per steer per day.cents	18.39	18.39	18.39	18.30	18.39	18.30	18.01	18.37
Profit per steer.....\$	43.08	36.08	37.85	33.88	36.58	32.32	32.05	36.93

Sheep.—A flock of Shropshires is being built up at Nappan, and now consists of eighteen ewes and two rams. The lamb crop of 1916 was a fairly good one. The ewes will be kept in the flock, and the rams sold as breeders.

A grade flock has also been established, with the view of carrying on a grading-up experiment, using a pure-bred Shropshire ram on the grade ewes.

Swine.—Two breeds are kept at Nappan, namely, Berkshires and Yorkshires, the total number on hand March 31, 1917, being fourteen. This year the Yorkshires did better than the Berkshires. In both cases, all suitable young pigs were sold for breeding purposes.

Ten 1-year-old grade Yorkshire and Berkshire sows were purchased in March to start a grade herd. The stock from these will be used for experimental work in feeding, to demonstrate the use of self-feeders vs. hand feeding; also the profit to be realized from pork production.

POULTRY.

The experimental work with poultry was somewhat di-organized this year owing to difficulty in obtaining a competent poultryman.

The cold and backward spring made hatching and rearing very difficult. The obtaining of early-hatched pullets, so necessary to egg-production the following winter, is one of the greatest poultry problems in this district.

Four breeds were kept during the past year, namely, Barred Rocks, 77; White Wyandottes, 70; White Leghorns, 57, and Rhode Island Reds, 27, a total of 231 birds.

Six incubators were used, three Prairie State, two Nonpareil Tamlin, and one Cyphers. The average percentage of fertile eggs for each breed was: Barred Rocks, 85.7 per cent; Wyandottes, 57.9 per cent; Rhode Island Reds, 54.8 per cent; and Leghorns, 84.0 per cent.

In tests for winter egg production, it was found that the cost per dozen eggs was considerably lower for the pullets than for the hens in most cases.

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BEES.

Rainy weather during June and July lessened the honey flow very materially, the average production per colony being only 26.14 pounds, as against 178.6 pounds the previous year.

Fifteen strong colonies were put into the bee cellar in the fall of 1916, and a comparison of different stores for wintering was carried on, using: (1) sugar syrup only; (2) half sugar syrup and half clover honey; (3) half sugar syrup and half golden-rod honey; (4) golden-rod honey; and (5) clover honey. The hives wintered on clover honey came through in the best condition.

A demonstration hive was taken to all the exhibitions and attracted much interest.

FIELD HUSBANDRY.

Rotations.—Three rotations are being operated at the Nappan Farm, namely:—

Rotation "B" (five years): First year, roots, or corn; second year, grain seeded down; third year, clover hay, fall ploughed; fourth year, grain, seeded down; fifth year, clover hay, ploughed in autumn.

Rotation "C" (four years): First year, roots or corn; second year, grain, seeded down; third year, clover hay; fourth year, pasture, fall ploughed.

Rotation "D" (three years): First year, roots or corn; second year, grain, seeded down; third year, clover hay, ploughed in autumn.

Rotations "B" or "D" are most suitable where plenty of rough pasture is available. "C" is an excellent rotation for a dairy farmer or any one keeping a large herd with insufficient pasturage.

Crop Yields.—The total area in grain, including test plots, was 18 acres, of which 3 acres were in wheat, 8 in oats, 5 in mixed grain, and 2 in barley. The average yields were: 26 bushels 56 pounds, 45 bushels 18 pounds, 25 bushels 8 pounds, and 7 bushels 38 pounds, respectively. The barley was practically a failure, due to unfavourable weather conditions during the early part of the season.

In roots and potatoes there were 12½ acres, including test plots; 7½ acres in turnips; 3 acres in mangels; 1½ acres in potatoes. The average yields were: 696 bushels 3 pounds, 476 bushels 43 pounds, 305 bushels 20 pounds, respectively.

FERTILIZER EXPERIMENTS.

A comparison is being made between plots receiving one or two fertilizing elements and a complete fertilizer, in order to ascertain the quantity and proportionate composition of a fertilizer which will yield the greatest profits. Another series of experiments seeks to discover the relative efficiency of different sources of nitrogen and phosphoric acid; different plots receiving different rates of nitrate of soda or sulphate of ammonia for the nitrogen and acid phosphate and basic slag, acid phosphate alone, basic slag alone, or bone meal for the phosphoric acid. The experiment with seaweed fertilizer was continued. Four plots to be planted to potatoes were used; two receiving manure alone, the other two manure and seaweed fertilizer. An average increase of 26.8 bushels per acre was noted on the plots receiving the application of seaweed fertilizer.

CEREALS.

Thirteen varieties of spring wheat were tested in duplicate plots of one-sixtieth acre each, the highest yield being obtained from Huron, 39 bushels 53 pounds; the lowest was White Fife, 22 bushels 45 pounds.

In twelve varieties of barley tested, Canadian Thorpe was highest with a yield of 39 bushels 18 pounds per acre, and French Chevalier lowest with a yield of 21 bushels 12 pounds.

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Thirteen varieties of oats were tried. Pioneer gave the highest yield, 63 bushels 18 pounds per acre; and Daubeney the lowest, 35 bushels 10 pounds.

Four varieties of buckwheat gave yields ranging from 26 bushels 32 pounds per acre for the Rye variety to 14 bushels 8 pounds for Silverhull.

In six varieties of field peas, Golden Vine yielded best, 11 bushels 20 pounds per acre; and White Marrowfat lowest, 4 bushels.

Field Crops of Seed Grain.—Fourteen acres were sown in acre and two-acre lots of wheat, oats and barley, for seed grain. The barley was almost a failure, due to excessive moisture. The wheat yielded from 28 bushels 48 pounds to 23 bushels 10 pounds per acre; the oats from 54 bushels 27 pounds to 37 bushels 13 pounds per acre. The greater portion of the seed obtained was thoroughly cleaned by use of the fanning mill and hand-picking, and was sold in limited quantities to farmers desiring a pure strain of selected seed.

FORAGE PLANTS.

Fifteen varieties of Indian corn were sown in duplicate plots of one one-hundredth acre each. The highest yield was obtained from Salzer's North Dakota, 21 tons 1,000 pounds; and the lowest from Free Press, 11 tons 750 pounds. Over a period of five years, the Longfellow variety, with an average yield of 14 tons 1,559 pounds, has proven as reliable a variety for the Nappan district as any so far tested.

Among twenty varieties of turnips, Best of All gave the highest yield, 30 tons 1,150 pounds per acre; and Lapland the lowest, 22 tons 500 pounds.

Sixteen varieties of mangels ranged in yield from 12 tons 1,000 pounds for Yellow Leviathan to 6 tons 1,700 pounds for Golden Tankard.

Six varieties of carrots were tested, the highest yield being obtained from Improved Short White, 17 tons 450 pounds; and the lowest from Orange Giant, 14 tons 650 pounds.

Three varieties of sugar beets yielded 5 tons 1,650 pounds, 5 tons 600 pounds, and 4 tons 750 pounds, respectively.

An experiment was begun to ascertain the possibility and profit of producing field-root seed. A quantity of turnips and mangels was selected in the fall of 1915 and stored in pits for the winter. The loss through decay was almost negligible. The roots were planted out June 5 and 6. During the season the plantation was injured by sheep breaking in, so no data as to yield are available, but the possibility of producing good-quality seed was established.

Imported seed of mangels and turnips was tested against Canadian-grown seed of the same varieties. The latter gave better yields in all cases. This test will be continued to get the results of several years' tests.

Grasses and clovers.—Three rows of Grimm's alfalfa were sown June 16. Growth was good throughout the season, but it winter-killed about 75 per cent.

HORTICULTURE.

Fruits.—Tree fruits were somewhat below the average, and much more scab was in evidence, owing to weather conditions having interfered with spraying. Small fruits gave fair returns.

Vegetables.—In addition to the tests of varieties carried on each year, the work of endeavouring to improve the strain of a few of the best varieties of potatoes was continued, the same sorts as in previous years being used, namely, Irish Cobbler, Carman No. 1, Wee McGregor, Empire State, Rawlings Kidney and Green Mountain. A marked improvement is being noticed, the yields from the selected seed being considerably heavier than from the unselected.

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Ornamental gardening.—The ornamental trees and shrubs made very good growth. The eighteen hedges of different kinds did well, and are now excellent specimens. The common spruce hedge is undoubtedly a beautiful one, and can be planted at little cost. Nothing adds more to the appearance of the farm home than a well-kept hedge.

The new perennial border was so arranged that the annuals are intermixed with the perennials, giving a continuous and attractive bloom from early spring to late fall.

FARM IMPROVEMENTS.

Buildings.—The old sheep barn was remodelled into an up-to-date bull-and-calf barn, the Rutherford system of ventilation being installed, and more light arranged for. The building is 32 by 63 feet. The old, loose stone wall was replaced by a good cement foundation. Inside, the building was divided into halves with a 5-foot passage through the centre, a floor of cement laid on a good foundation of 6 inches of stone, and the walls and ceiling sheathed with $\frac{7}{8}$ -inch matched lumber.

On the north side, six bull box-stalls were strongly built of 2-inch dressed lumber, with grated fronts and doors opening to the north into the yard, which will later be fenced in specially for bulls. Five of the box stalls are 9 feet 2 inches by 12 feet, and one is 15 feet 2 inches by 13 feet. Partitions between pens are 7 feet high; windows 2 feet by 2 feet light each pen.

On the south are six calf pens, 9 feet 2 inches by 11 feet 6 inches, with partitions 4 feet 6 inches high between. The fronts of pens are finished with calf-pen stanchions. Light is admitted through large windows on the south, thus making ideal pens for young calves. The building has been rewired for electric lights and painted on the outside to match the rest of the stables. This adds greatly to the general appearance of the stables.

A rough shed for feeding steers was erected on the hillside just east of the main barn, 20 feet by 40 feet south. This shed has 7-foot posts in front and 5-foot posts at the back. It was single boarded, battened, and divided into two pens, 20 feet by 20 feet each, by a plank partition. A long trough was built at the back running the full length of the shed, with a shutter opening in from the north side for feeding stock. The roof was single boarded, covered with paroid roofing. One window 2 feet by 3 feet lights each pen from the south. Doors 4 feet by 6 feet 6 inches open into the yard on the south.

Electric Light System.—The system was installed in 1914, and was this year extended up to the new sheep barn, making it much more convenient for looking after the stock. The new bull and calf barn was rewired to suit the remodelling of the building.

Fencing.—All line fences, which have been up for some twenty years, were gone over and repaired. Around the wood lot a roadway of 20 feet was cut out in the winter and spring of 1917 to make way for the erection of a new fence, as the old one had outlived its usefulness. Over 8,000 poles were cut and hauled to place during the winter.

Clearing New Land.—The clearing of new land by prisoners of war was continued during the year, the work starting on the 25th day of April and proceeding throughout the season, as the weather permitted, until the 19th of January. Some 35 acres were chopped out of forest. The brush was piled and burned before stumping started. All timber cut was manufactured into wood and props. A total of 41 acres was stumped, piled, and levelled with pick and shovel, making it ready for the plough.

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This ground was very much more difficult to plough than was the first 26 acres, as the stumps were much larger, ranging in size from 3 inches to 36 inches in diameter, were mostly of hemlock, hardwood, spruce, and fir, and were very numerous. Two kinds of stumping machine were used, the Improved Logan stumper and the Kirstin one-man stumper. The latter machine gave us better satisfaction for all stumps up to 12 inches. The former has the greatest power, but will not stand the wear and tear so well and, consequently, it costs more to keep it in repair.

Water System.—The new system laid last year is giving great satisfaction, and has plenty of force. The line branching off from the main pipe to the watering trough in the yard was changed, being run out into the centre of the yard instead of up against the side as it was previously. Here a circular cement trough was built, with an overflow pipe into the drain in the ravine. An underground shut-off was put in the water line in order to prevent freezing during cold weather.

Barnyard.—The old barnyard was cut down about a foot deeper, and the earth thus removed was wheeled over to a ravine just east of the yard, which was some 5 to 6 feet deep. In the ravine a large 18-inch drain was built, mostly of cement tile, making a good drain to carry all surface water from the yards and fields above. Then the ravine was filled level with the main barnyard. Two 6-inch tile drains were laid from the main barn to the large drain in the ravine. This carried off all surplus water from the buildings. Along in front of the cow stable the large stone taken from the wall of the old sheep barn was laid, making a solid stone walk 8 feet wide along the entire front of the stable. The remainder of the yard will be stoned and gravelled next season, thus making a clean yard for the dairy stock, which will be a great improvement over the old yard that was frequently very muddy.

Roadmaking.—As much time as could be spared from farm work was given to improving the public highway north and south of the Farm, more especially with the use of a split-log drag. Likewise the main driveways of the Farm were kept in good condition throughout the year. The main driveway which runs east and west through the centre of the Farm was straightened out and made 20 feet wide back to the second brook, making a good road for either wagons or autos, and a good cement culvert was made over the first ravine, enabling the road to be graded up some 3 feet higher. This road will be continued to the newly cleared area next season.

MEETINGS ATTENDED.

During the year the superintendent attended and gave addresses at the following agricultural meetings: Nappan school, June 21; Cumberland County farmers's picnic held at the Farm, July 19; visited seaweed experiments throughout Cumberland County; August 15; visited flax fields in Pictou County, August 28-29; judged field crops in Cumberland County, September 1 and 2; Halifax exhibition, September 21; judging school gardens, Little River, Mansfield, and Leicester, September 25; Stewiacke exhibition, September 27 and 28; Port Elgin exhibition, October 3 and 4; Sackville exhibition, October 11; Apple show in St. John, November 1; judging at Nappan school exhibition, November 10; Agricultural meeting at Southampton, December 1; Moncton poultry show, December 11-15; Potato show at Woodstock, December 26-28; Truro short course, January 8; Kings County farmers' rally at Kentville, January 10; Nova Scotia Farmers' Association at Amherst, January 23-26; New Brunswick Farmers' and Dairymen's Association at Fredericton, January 29 to February 2; Short course at Sussex, February 5-7; Short course at Woodstock, March 12-15; Chatham short course, March 19-22.

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EXHIBITIONS.

An exhibit of farm produce grown at Nappan, also of model, etc., was staged at Halifax, September 13-21; Antigonish, September 19-20; Stewiacke, September 25-27; Sydney, October 3-6; Arichat, October 10-11; Port Elgin, October 3-4. Arrangements were made to put one up at Musquodoboit and Guysborough, but owing to the delay of exhibit by rail it arrived too late at the latter places.

EXCURSIONS AND VISITORS.

Five excursions were held at the Farm during the season; a great many small parties also visited the Farm. The approximate number of visitors during the year was 2,350.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

THE SEASON.

After a very mild November and December in 1915, with a heavy rainfall in the latter month, and about two inches of snow on the ground after the 9th, January followed with continued mild weather and only about five inches of snowfall. The fields, in fact, were practically bare, and there was just enough ice on the roads to make passable sleighing. February, however, was colder than the average, with a snowfall of 25.8 inches. Thawing weather took off most of it, and the end of the month saw many bare spots in the fields, with more or less ice over considerable areas. March was a cold month, the mean temperature of 19.8 degrees being 6 degrees below the average. The snowfall was 18.8 inches, with no rain whatever. The ground was thus well protected until, on the 28th of the month, a warm wave took off every vestige of snow. Fortunately, April was cloudy with no severe frost or hot sun to kill the exposed roots. It was also the driest April on record, and there was practically no start in vegetation until May. May was also dry, with a mean temperature of 50.2 degrees and only three slight frosts in the early part of the month. There seemed to be an abundance of moisture in the land, however, and growth was good. The first half of June also gave favourable weather, though more sun and heat would have given more rapid growth, but the latter half brought a deluge, the rainfall being 6.12 inches in thirteen days, and more or less crop was damaged by flooding and washing. Turnip seeding that would otherwise have been finished by the 20th June had to go over into July. This latter month brought very favourable weather, with precipitation and temperature slightly above the average. August, with a mean temperature of 66.1 degrees, was 3.1 degrees warmer than the average and, with only 1.59 inches precipitation, had less than half the average rainfall. September followed warm and dry, and October, while comparatively cool, was a most favourable month for harvesting and farm work generally. So far, therefore, as weather conditions went, the season was, on the whole, very favourable for crop production. Clovers and grasses came through with very little winter-killing, and started strong. August and September were rather warm for the best growth and development of potatoes and root crops, though unusually favourable for corn.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature F.		Precipitation.	Total Sunshine.
	Highest.	Lowest.		
1916.	°	°	Inches.	Hours.
April	64	19	1.41	169.25
May	76	30.5	2.91	203.6
June	81	37	6.12	139.45
July	93.5	40	3.96	215.6
August	92.5	49	1.59	235.35
September.....	81.5	33.5	2.95	157.25
October	80	22	3.6	151.85
November.....	64	- 4	2.52	88.6
December.....	45	-10	3.02	77.1
1917.				
January	34	-22.5	4.01	119.55
February.....	38.5	-19	2.9	129.2
March.....	47.5	- 5	2.27	159.81
Total for year			37.26	1,846.6

LIVE STOCK.

Horses.—Ten draught mares, two geldings, and two general-purpose mares have been kept busy on the Station work all through the year, with the exception of the geldings which were laid off from December 1 until March 31. One of these, at a food cost of \$10.30, from January 1 to March 31, lost 110 pounds in weight. The other, at a food cost of \$9.35 for the period, lost only 35 pounds in weight. The cost per horse for feed while at hard work during the period December 1 to March 31, was \$32.50. The average daily ration was 9.9 pounds grain, 18 pounds hay, and 3 pounds roots.

Two colts, a grade Clyde gelding and a grade Percheron filly, have been raised to three years old and a weight of 1,400 pounds at a food cost of \$96.95 each. They are thoroughly broken, and are worth, on the present market, from \$200 to \$225 each.

Dairy Cattle.—The three pure-bred herds of Shorthorns, Ayrshires, and Holsteins are gradually increasing, and the grade herd as the young half-bred grade heifers are coming on, is being reduced. Every individual in the grade milking herd made a profit last year over cost of feed, the variation being from \$69.29 down to \$26.08, milk all made into butter, which sold at 35 cents per pound, and no credit given for calf.

Beef Cattle.—Thirty steers were bought in September and October at a cost of 6.17 cents per pound. They were sold on March 17 at 9.5 cents per pound. It was found more profitable to feed 4 pounds of grain per day than 6 pounds, and ensilage alone during the latter part of the feeding period gave greater gains than roots and ensilage combined. A substantial profit was made this year in the feeding operations.

A feeding test, duplicated, with four lots of calves in each test, was conducted to determine the cost of rearing calves. On new milk a pound of gain cost 13.2 cents; on skim-milk and a home-mixed grain ration added, a pound of gain cost 6.7 cents; on calf meal and water, a pound of gain cost 14.8 cents; and on calf meal and skim-milk, a pound of gain cost 8.9 cents.

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Sheep.—The flock of Shropshire sheep has done very well. They went into winter quarters very fat after fall feeding on rape, received a small grain ration after January 1, and began to drop lambs in February. At six weeks old the lambs are weighing from 40 to 50 pounds each.

POULTRY.

The stock kept includes 80 Barred Rocks, 101 Rhode Island Reds, 90 White Leghorns, and 78 White Wyandottes. The number of eggs laid during the year was 28,056. Breeding pens made up from the best laying pullets were mated to cockerels imported from the leading breeders in the respective breeds. The chicks raised numbered 1,589 from 2,432 eggs set. Early hatched pullets began laying in November.

BEES.

Three colonies of bees came out of winter quarters, and two swarms were taken off, and 38 pounds of honey removed. These five colonies were well fed with syrup in September to bring the weight of the hive up to about 80 pounds, and then packed in planer shavings inside the winter cases. Four colonies are alive this spring.

FIELD HUSBANDRY.

Owing to preliminary work, such as clearing, draining, breaking land, fencing, etc., being necessary, regular work with rotations and field cultural experiments has not yet been begun at Fredericton. Seventy-three acres were in grain and roots in 1916, and 38 acres in hay. The latter yielded at the rate of 2 tons 58 pounds per acre. One and one-quarter acres were sown to a mixture of peas, oats, and barley, and the crop cut green and fed to the cattle in the stable.

Fifty acres were seeded to oats; part of it was rough, newly-broken land where, on account of late seeding and the impossibility of getting a good seed-bed, the yield was only 15 bushels per acre. On well-cultivated land the yield was slightly over 50 bushels. The seed sown on the area was 185½ bushels, and the total yield 1,667½ bushels.

Arthur peas yielded 26 bushels per acre.

The yield of swede turnips averaged 520 bushels per acre, and the white turnips 923 bushels per acre. Four thousand pounds waste lime applied to 1 acre gave an increased yield over the un-limed acre beside it of 113 bushels.

Many varieties of turnips and mangels were tested in plots. The highest yield for swede turnips was 47 tons 640 pounds per acre from home-grown Kangaroo seed, and the average of twenty-three varieties was 33 tons 200 pounds per acre. The yield of twenty-three varieties of mangels averaged 28 tons 180 pounds per acre, and the highest yield was 41 tons 400 pounds per acre from Ottawa-grown Yellow Intermediate seed.

Twelve and three-quarter acres of Indian corn gave a weight, when freshly cut, of 15 tons 818 pounds forage per acre. When hauled to the silo after several dry days, the weight was 10 tons 1,513 pounds per acre.

Peas, oats and vetches gave 10 tons 1,500 pounds per acre of green feed. The crop from 4 acres was put in the silo and fed out during August, September and October.

FERTILIZER EXPERIMENTS.

One hundred and twenty plots of one-twentieth acre each were under fertilizer experiments. In one series where the three-year rotation was completed, it was found, among other data, that where 500 pounds of complete fertilizer per acre was used there was a greater net profit than where 1,000 pounds was used.

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In field work, experiments both with fertilizer and with lime were made on corn and turnips. With 900 pounds 4-10 fertilizer per acre on corn for silage, an increase of 4 tons 392 pounds per acre was obtained, not quite sufficient, however, to pay the whole cost of fertilizer. Dried and ground seaweed at the rate of 1,500 pounds per acre gave an increase of 52 bushels and 40 pounds of potatoes when used with 1,000 pounds of 4-10 fertilizer; when used with 18 tons stable manure per acre the increase was 10 bushels and 40 pounds.

The addition of 4,000 pounds lime per acre on turnips gave an increased yield of 113 bushels. On other crops, on plot experiments, and even on alfalfa, lime gave negative results. These results are, of course, not conclusive, and the work must be continued for a series of years before reliable results may be hoped for.

CEREALS.

Five varieties of wheat were tested. Early Red Fife gave the highest yield, 18 bushels 45 pounds; and Red Fife the lowest, 12 bushels 8 pounds. Early Chevalier gave the best yield among the five varieties of barley tried, 24 bushels 3 pounds per acre; and Manchurian the lowest, 6 bushels 42 pounds. Of five varieties of oats, Banner yielded best, 36 bushels 22 pounds; and Daubeney lowest, 23 bushels 23 pounds per acre. Of five varieties of peas, White Marrowfat, the highest, gave a return of 15 bushels 30 pounds per acre; and Brittany, the lowest, 8 bushels.

FORAGE CROPS.

Ten varieties of flint corn, eight of dent, and three of sweet corn were tested. Additional plots of Quebec Yellow, Free Press, and Canada Yellow were grown from seed ripened at this Station in 1915.

The yield of ensilage per acre in tons varied from 14.33 tons for Yellow Flint (unnamed) to 2.33 tons for Bear Island Flint. The highest percentages of ripened ears, 64.9, was given by Free Press, the lowest by King Philip, none. In the dent, or ensilage varieties, Golden Glow gave the highest yield, 15.8 tons per acre, and Northwestern Dent the lowest, 8.9 tons, of ensilage.

The three varieties of sweet corn tried, Brannan Sweet, Golden Bantam, and Fordhook, all ripened fair crops.

Twenty-three varieties and strains of turnips yielded well in all cases, the highest being Kangaroo (Fredericton seed), with a yield of 47 tons 650 pounds per acre, and the lowest, Canadian Gem, 26 tons 700 pounds.

In twenty-two varieties and strains of mangels tested, Yellow Intermediate (Ottawa seed) gave the highest yield, 41 tons 400 pounds per acre, and Danish Sludstrup (commercial seed) the lowest, 21 tons 250 pounds.

Three varieties of sugar beet gave an average yield of 16 tons 1,333 pounds per acre.

Among six varieties of carrots grown, Ontario Champion, the highest, gave a yield of 23 tons 500 pounds, and Orange Giant, the lowest, 16 tons 1,600 pounds.

In the forty-five plots of clovers and grasses, there was considerable winter-killing, especially of meadow fescue, sheeps' fescue, perennial rye grass, and red clover. Alfalfa also winter-killed badly. The value of alfalfa for this district has not yet been proved.

Growing Turnip Seed.—In the autumn of 1915, four thousand roots of the Invicta variety of swede turnips were packed in a cellar with sand, care having been taken not to injure the crown of the turnip nor to remove any of the roots.

While the outside of this pile of roots kept well, it was found in the spring that the roots in the interior had spoiled; consequently, only about 10 per cent of the

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number stored were fit to plant, and these did not all grow. A very good quality of seed was obtained, and in the autumn of 1916 roots from the same variety were stored in crates holding six bushels each. These have apparently kept perfectly, and will be planted for seed production.

HORTICULTURE.

Fruits.—There are now 872 trees in the young orchards, namely, 651 apple, 125 pear, 72 cherry, and 24 plum trees. In the commercial orchard, 30 trees were added during the year.

Winter-killing has so far been severe, 25.17 per cent of the original orchard trees planted having been killed since 1914.

The crop in the old apple orchard was light, but of fair quality.

In small fruits, all varieties did well. Thirty-one sorts of currants, eighteen of gooseberries, eleven of raspberries, and twenty-one of strawberries were under test.

Vegetables.—Variety tests were carried on with asparagus, beans, beets, Brussels sprouts, cabbage, carrots, cauliflower, celery, corn, cucumbers, lettuce, muskmelon, onions, parsnips, peas, radish, squash, tomatoes, and potatoes. Beans were badly attacked by anthracnose, and cauliflower by bacterial soft rot. With these exceptions, all vegetables did well.

Eight and one-half acres of potatoes were grown, all but 1 acre being devoted to varietal, cultural, pathological, or spraying tests. The remaining acre was handled commercially to get data on cost of production. The total cost for the acre was \$89.02, including seed, rent, cultural operations, and depreciation of machinery. The yield was 330 bushels of marketable potatoes and 16½ bushels cull. The total value of the crop, at market prices at harvesting time, was \$333, and the profit \$243.98.

One hundred and sixteen varieties and strains of potatoes were under test. Work in selection of seed was carried on, also cultural tests such as planting at different distances apart, level vs. hill planting, number of eyes to a set, spraying mixtures, etc.

Ornamental Gardening.—Groups of trees and shrubs were set out on the grounds in the fall of 1915. These wintered well. The perennial borders bloomed freely, as did the annuals. The specimen hedges planted in 1915 made excellent growth.

FARM IMPROVEMENTS.

Buildings.—The pumping station, burned in 1915, was replaced by a concrete building, covering the old site with an ell added to include the new well. Concrete blocks, 4 inches thick, were used, placed to leave a dead-air space of 3 inches. It was aimed to make this building as nearly fire-proof as possible, so the roof was covered with asbestos slate shingles. The total cost was \$3,648.36, including repairs to pneumatic tank and necessary shafting, belting, piping, etc., for power plant.

A concrete foundation was placed around the weigh scales, and a house built upon it with boarded and battened walls and steel roof, at a total cost of \$228.52. A colony poultry house 8 feet wide by 12 feet long, and a poultry feed storehouse 12 feet wide by 18 feet long, were also built at an approximate cost of \$150.

Fencing and draining.—No permanent fencing was undertaken during the year. Temporary fencing with both woven wire and barbed wire to keep the stock back as new land was being cleared, did not involve much expenditure, as outside of a few stretching posts only light stakes driven with a maul, were used.

Drainage was proceeded with where most needed. One thousand rods of drains were made, of which 760 rods were laid with tile, 166 rods with stone, and 74 rods of open drains.

The removal of the sides of 60 rods of open ditching was done with team and scraper to form a swale for surface drainage. Wherever possible the underdrains

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were filled by horses and scraper. The total expenditure for all this work was: for labour, \$1,744.84; and for tile, \$328. Besides the above, 6 acres of newly broken land, when ploughed the second time, was thrown up into 30-foot ridges, and the dead furrows cleaned out to give surface drainage.

Clearing land.—Stumps were removed from 10 acres, a portion of them burned, and this part well ploughed. Boulders were blown out, broken up, and removed from land previously stumped and cropped. Over one hundred tons per acre of stone were taken off one area of 6 acres, and used to make a driveway across a gulch. A half-mile of road-sides was cleared of stumps and boulders, the land smoothed and seeded. The total expenditure on this work was: for labour, \$1,715.95; and for stumping powder, \$365.98.

Roadmaking and grading.—Some progress was made in preparing the land for lawns and in laying stone foundations for roads through the lawns. Stones and boulders were removed, where necessary, from the 6 acres under preparation, and those that could be broken were placed along the road lines; the other stones were taken to the river bank. The road lines were scraped out to a depth of 15 inches and a width of 15 feet. Stones were placed in these sufficient to give a broken-stone foundation at least 1 foot in depth. Some ditches were cleaned out along highways crossing the Station property, and grading was done both on the highways and on some of the farm roads.

EXHIBITIONS.

As no fall exhibitions were held in the larger centres in New Brunswick, the Experimental Farms' exhibit was not sent out over a circuit of fairs. An exhibit of fruit, potatoes, and seed corn was made in November at the New Brunswick Fruit Growers' Association display at St. John, and a showing of potatoes, seed corn, and seed grain was made at the New Brunswick Potato Growers' Association Exhibit at Woodstock in December. In January at the Provincial Seed Fair at Fredericton, an exhibit of potatoes, corn, and grain was made by the Experimental Station.

At all the above fairs, literature was distributed and names taken for the mailing list.

SHORT COURSES AND MEETINGS.

The superintendent acted as instructor in Animal Husbandry, and some crop-growing subjects at the Short Courses held at Woodstock, Sussex, and Chatham during the winter, and addressed the Potato Growers' Convention at Woodstock in December, as well as attending meetings in conjunction with Prof. J. W. Mitchell of the Provincial Agricultural Department at New Denmark, Andover, Centreville, Hartland, Bathurst, Nappan, and Doaktown.

EXCURSIONS.

Three excursions came to the Station during the year. On the 23rd August the Farmers' and Dairymen's Association of New Brunswick arranged for a summer meeting here, and between twelve and thirteen hundred people came. Arrangements were made to give all, who wished it, a mid-day lunch, and addresses were given by the Director, the Dominion Animal Husbandman, the President of the Farmers' and Dairymen's Association, and the Superintendent of the Station.

In September, between three and four hundred Normal School students visited the Station, and in February three hundred and fifty members of the Farmers' and Dairymen's Association, attending their annual meeting in Fredericton, spent a day at the Station to take live-stock judging work, when a mid-day meal was provided for them, and in addition to the judging work, addresses were given by Messrs. E. S. Archibald, W. W. Baird, G. C. Cunningham, and the superintendent.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

The winter of 1915-16 was colder than the average, with a somewhat lighter snowfall. The snow disappeared early in March. April was dry and cool with high winds, which dried the soil sufficiently to permit of seeding commencing on the 27th. Good seeding weather continued until May 10, but the weather then turned cool, with frequent rains, and continued so during the rest of May and most of June. Seeding was consequently delayed and growth slow until towards the end of June.

July and August were extremely dry, while the next two months were very wet. No damaging frost was recorded from May 1 to September 20, which is unusual for this district.

Hay was a good crop; other crop yields were lessened by the dry weather of July and August. Potatoes were especially affected.

Considerable fall ploughing was done in September and October, in spite of the dry condition of the soil.

Snowfall in 1916-17 has been abundant, and the soil has been well protected.

Month.	Temperature F.				Precipitation.	Sunshine.
	Date.	Maximum	Date.	Minimum	Inches.	Hours.
1916		°		°		
April.....	25	61.2	3	18.4	0.94	218.1
May.....	29	77.4	3	30.0	3.47	185.2
June.....	14	81.0	2	39.4	5.18	170.4
July.....	25	91.7	3	53.0	1.89	286.4
August.....	21	92.4	6	43.0	0.75	237.1
September.....	9	89.4	18	35.2	3.07	143.6
October.....	4	73.2	12	22.2	5.66	125.2
November.....	9	59.2	24	- 1.1	2.43	64.2
December.....	3	44.8	31	-14.7	4.32	71.5
1917						
January.....	.....	38.6	.....	-28.2	3.10	278.0
February.....	.....	34.4	.....	-19.0	2.40	288.0
March.....	.....	44.6	.....	8.2	3.88	370.0
Totals.....	.....	.....	.....	.....	37.09	2,438.7

LIVE-STOCK.

Horses.—The five teams of draught horses were kept constantly employed on farm work, clearing land, hauling stone, and gravelling roads. A driver is also kept for light work, carrying mail, etc. An experiment in the cheap wintering of horses was carried on.

Cattle.—The herd number sixty head in all, partly pure-bred Ayrshires and the best Ayrshire grades.

Sheep.—A pure-bred flock of Shropshires is kept, and also a flock of common ewes, which are being used in a grading-up experiment. The flock was cheaply wintered, being fed almost entirely on hay, oat straw, and roots; very little grain was

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given until near lambing time, when a little bran and oats were fed and the roots reduced. The lamb crop has been a good one so far, eighteen ewes having dropped twenty-nine vigorous lambs.

Swine.—The Yorkshire is the breed kept, and the bacon hog is the type aimed at.

POULTRY.

Work with poultry was commenced with 100 Wyandottes. The flock has now been increased to 200. Incubation results last spring were fair.

BEES.

The apiary consists of thirty-five hives of common bees and Italians. Experimental work is carried on in wintering inside and outside; fall and spring feeding, increasing honey production, and preventing swarming. The average yield of honey per colony was 120 pounds, with a highest yield of 272 pounds and a lowest of 63 pounds.

FIELD HUSBANDRY.

Rotations.—Three rotations are being tried at the Ste. Anne Station:—

Rotation "D" (three years). First year, hoed crop; second year, grain, seeded down; third year, clover hay, two cuttings if possible.

Rotation "C" (four years): First year, hoed crop; second year, grain, seeded down; third year, clover hay, two cuttings if possible; fourth year, mixed hay; land ploughed in August, well cultivated and ridged up in fall.

Rotation "A" (five years): First year, hoed crop; second year, grain, seeded down; third year, clover hay, two cuttings if possible; fourth year, mixed hay or pasture; fifth year, grain, seeded down. Clover allowed to stand until next spring, when it is ploughed under in preparation for roots.

Crop yields.—The yields in 1916 from field lots of grain, Indian corn, hay, and roots were as follows: Corn for ensilage, 12 tons 1,145 pounds per acre; roots, 19 tons 1,845 pounds; wheat, 40 bushels 27 pounds; peas, 28 bushels 8 pounds; oats, 72 bushels 18 pounds; and hay, 2 tons 1,325 pounds.

Records of cost of production of all field crops grown are carefully compiled each year.

CEREALS.

Comparative tests of varieties have not yet been commenced at the Ste. Anne Station, owing to the necessary preliminary preparation of the land now going on. However, the varieties of wheat, peas, barley, and oats best suited to the district are grown on the Station each season, and a large quantity of pure selected seed was sold or distributed this year.

FORAGE PLANTS.

Fifteen varieties of forage corn were tested this season. In a three-year test, Longfellow and Compton's Early have proved the best suited to the district. Of twenty-five varieties of forage beets, Yellow Intermediate and Long Red gave the highest yields. In sugar beets, Vilmorin's Improved and Klein Wanzleben yielded best. Fifteen varieties of turnips and five of carrots were also tested.

HORTICULTURE.

Orchards and Small Fruits.—The orchards now contain 1,045 trees, namely, 736 apple, 209 plum, 81 cherry, and 19 pear trees. The varieties represented are 122 apple,

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30 plum, 15 cherry, and 8 pear. The small fruit and vegetable tests are carried on between the rows of trees in part of the orchard; and in the remaining part, orchard cover crops and cultural methods are compared.

Among the small fruits under test are: currants, 29 varieties, raspberries 8, gooseberries 7, and strawberries 18 varieties.

In vegetables, variety tests were conducted with beets, beans, peas, corn, cabbage, potatoes, lettuce, parsley, carrots, oyster plant, onions, cauliflower, celery, radish, cucumbers, pumpkins, squash, turnips, tomatoes, and muskmelons.

Twenty-five varieties of potatoes were grown and compared. This will be repeated for five years, when it is hoped that some valuable conclusions can be drawn. Records were kept of the cost of growing an acre of potatoes.

The total cost was \$82.53. The yield was 203 bushels 54 pounds, making the cost of production per bushel, 40½ cents.

The display of flowers during the season was a good one, in spite of the drought. Ornamental trees and shrubs made satisfactory growth.

SPECIAL CROPS.

One one-twentieth acre plot of tobacco was grown; this matured satisfactorily, and was shipped to the Central Farm, Ottawa, for treatment.

FARM IMPROVEMENTS.

Buildings.—One hen-house, 16 by 32 feet, was built, and two colony houses. A number of repairs were made to other buildings.

Draining and Fencing.—Eighteen acres of land were tile drained, and 1,840 loads of stone gathered. Over 100 rods of fencing was put up, and the gravelling of the farm roads was completed.

EXHIBITIONS.

An Experimental Farms' exhibit was shown at Montmagny and at seven county fairs. The display attracted much attention; eighteen hundred applications to be put on the mailing list were received.

MEETINGS.

The superintendent, in addition to being present at eight exhibitions and fairs, took part in the Short Course given at the Ste. Anne College of Agriculture, and spoke at four farmers' conventions.

VISITORS.

Over 3,500 farmers visited the Station during the year.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

CHARACTER OF SEASON.

The months of May, June, July, August, September, and October were warmer, wetter and duller than the average of the last five years, the mean temperature being, respectively, 57.52 and 65.05° F.; the precipitation, 27.19 and 23.43 inches; the number of hours of sunshine, 1,073.4 and 1,109.7. The season was longer than usual without frost, the last one occurring on May 8 and the first one on October 10. Of the different crops grown in the district, hay was extra good; pastures excellent until the drought of midsummer; grain, poor; silage corn and roots, below the average; potatoes, poor; flax, good; tobacco, extra; apples, above the average; plums, a little below the average; strawberries and raspberries, the best in years; currants and gooseberries, extra; vegetables, about as usual; flowering plants, splendid. The main characteristics of the season were the wet spring, the drought of midsummer, and the fine autumn.

METEOROLOGICAL RECORDS, 1916-17.

	Temperature F.		Precipitation.				Total Sunshine.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in hours.	
1916.	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April.....	63.0	17.2	1.12	6.00	1.72	0.80	190.8
May.....	75.0	31.2	6.36	.....	6.36	1.22	157.3
June.....	79.0	44.2	5.47	.....	5.47	1.70	165.8
July.....	91.0	45.2	3.96	.....	3.96	2.00	260.0
August.....	89.0	45.2	2.76	.....	2.76	1.00	223.2
September.....	77.0	32.2	3.22	.....	3.22	1.22	142.1
October.....	72.0	24.2	5.42	.....	5.42	1.05	125.0
November.....	63.0	— 4.1	3.23	5.60	3.79	1.02	64.9
December.....	40.0	—13.9	0.66	20.80	2.74	0.90	64.9
1917.							
January.....	37.0	—21.8	0.50	45.70	5.07	0.90	55.1
February.....	35.0	—21.8	.....	27.00	2.70	0.80	74.0
March.....	51.0	— 6.0	1.52	26.50	4.17	1.25	125.3
Total.....			34.22	131.60	47.38	.....	1,648.4

LIVE STOCK.

All the live stock kept in very good condition throughout the year.

DAIRY CATTLE.—The herd comprises forty-two head, thirty-six of which are pure-bred, and six grade, French Canadians. These cattle are kept for five purposes: supplying milk to the dairy, experimental breeding, experimental feeding, experimental housing, and to distribute good breeders at reasonable prices.

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Milk production.—Ten cows from 3 to 11 years of age completed a lactation period between April 1, 1916, and March 31, 1917. They averaged 5,304 pounds of milk, testing 4.08, which is equivalent to 255.11 pounds of butter.

Experimental Breeding.—Out of nine grade cows bought for this purpose, only two were profitable producers; and none of their heifers, by a scrub, and also by a registered bull of unknown ancestry was worth keeping. This shows plainly that the scales and Babcock test should be used to find out the good producers, and that these must be bred to bulls out of profitable dams, if any headway is to be made.

Experimental Feeding.—There are two projects: the best quantity of concentrates for dairy cows, and the cost of raising heifers.

Best Quantity of Concentrates for Dairy Cows.—This experiment has now been made four years in succession, during five of the winter months. Animals are chosen of nearly equal weights so that the maintenance ration may be about the same for all, and they receive exactly the same quantity of roughages, such as hay, straw, silage, roots. The bedding is sawdust, and there are divisions in the mangers, so that each cow can only eat what she receives. When the animals are chosen, their previous records are considered, so as to avoid errors due to individual capacity as milk and fat producers. The average for four years shows that the lot receiving as much meal as would be eaten, which was 1 pound per 2.19 pounds of milk, gave a profit over feed of \$16.10 in 148 days, the lot receiving 1 pound of meal per 4 pounds of milk gave a profit of \$14, and the lot receiving 1 pound of meal per 8 pounds of milk gave a profit of \$12.42. Feed was valued as follows: hay, \$7 per ton; roots and silage, \$2 per ton; meal, 1½ cents per pound; whilst butter was calculated at 28 cents per pound, and skim-milk at 20 cents per cwt.

Cost of Raising Heifers.—Feed valuations are given so as to compare results of one year with another, as prices change very often: whole milk, \$1.50, and skim-milk, 20 cents per cwt.; meal, 1½ cents per pound; hay, \$7; green feed, roots, silage, \$3 per ton; pasture, \$1 per month. The results of two years show that it cost, on an average, for feed alone, \$27.44 to bring a heifer to 13 months and 4 days; \$52.39 to bring one to 18 months and 10 days; \$65.05 to bring one to 26 months and 1 day. The three whose feed was weighed until this last-mentioned time received, on an average, 1,028 pounds whole milk, 7,921 pounds skim-milk, 774 pounds meal, 3,774 pounds hay, 6,133 pounds roots, 5,923 pounds silage, 278 pounds green feed, and were 69 days on pasture. Their average weight was 775 pounds. With these figures, a farmer can see, at current prices, what it costs to raise a heifer; and when he does see this, he will no doubt commence to think that only the daughters of heavy producers should be raised if a profit is to be made.

Experimental Housing.—Buildings are non-productive and very costly. If most of the stock can be wintered in single-boarded sheds, profits are sure to be higher, because the extra feed required is more than counterbalanced by the better health of the animals. During the winters of 1915-16 and 1916-17, an aged bull, a 2-year-old, and a yearling have been outside—the first two mentioned during two winters and the latter during one winter—without the least sign of suffering. Cows were bred during the coldest spells, and the old bull certainly was a better server outside than he had been when kept in a box stall. Beginning in the autumn of 1917, all heifers will be kept in a single-boarded shed from the time they are about six months of age until within a few days of calving.

Selling Breeders at a Reasonable Price.—The three bulls used in 1917 are out of cows which have qualified for Record of Performance, and one of them has for dam and dam of his sire two cows which have that distinction. There are more French-Canadian cows, at this Station, that have qualified for the Record of Performance

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than in any other herd. Out of such foundation stock it is wellnigh impossible not to breed good stock and it is practically certain that bulls from this Station will improve the herds wherever they may go.

HORSES.—There are now twenty-four horses, including nineteen registered French Canadians, four draughters, and a driver. They are kept for five purposes: work on the farm, experimental breeding, experimental feeding, experimental housing, and to distribute high-class breeders at reasonable cost.

Work.—During the year, each horse averaged about 150 full days of ten hours' work, leaving aside the unbroken colts. One must remember that seven mares dropped and raised foals, which cut down the number of hours of work.

Experimental Breeding.—Three projects are under investigation: raising fall colts, close breeding, work versus no work for brood mares.

Raising Fall Colts: If this is found feasible, the mares will have the full growing season to work. To throw some light on the subject, two mares were served to drop their young in October. At first, the youngsters did not seem to do very well, but they soon picked up, and on March 31, 1917, a colt which was 5 months and 12 days old weighed 680 pounds, the average weight of his sire and dam being 1,285, whilst a filly which was 6 months and 2 days weighed 535 pounds, the average weight of her sire and dam being 1,200.

Close Breeding: A mare served by her son dropped a filly which is not doing as well as two others of about the same age from unrelated parents. A defect which both sire and dam had in common, that is, a rather rough head with a full throat latch, was intensified in the filly. This is a mooted question, and experiments will be continued, always with stock bred at the Station, so that there may be no question about the relationship of animals used.

Work versus no Work for Brood Mares: The same mare was used three years for this experiment. In 1914-15, she was worked carefully but all the time until she foaled; in 1915-16, she was kept idle in a box stall all winter, but worked about a month before foaling in the spring; in 1916-17, she was kept idle but outside, having a single-boarded shed where she could go in at will, and worked about a month before foaling in the spring. In each case, she dropped and raised a strong filly. It is probably better to work a mare carefully all the time before foaling, but a farmer who cannot do so, need not, for this reason alone, abandon horse raising.

Experimental Feeding.—This consisted in recording feed eaten by young animals, and by a team of workers. The following values are arbitrary, and can be changed according to current prices: whole milk, \$1.50, and skim-milk, 20 cents per cwt.; molasses 3, wheat 2, oats 1.5, and bran 1 cent per pound; hay, \$7 per ton.

Cost of Feed in raising Horses: At the above prices for feed, it cost \$19.16 to bring a youngster to 10 months 7 days from the time it was weaned, at five months; \$79.77 to bring one to 1 year, 9 months, 10 days; \$138.89 to bring one to 2 years, 8 months; \$162.05 to bring one to three years. The weights were, respectively, 672, 1,128, 1,125, 1,300, which is much more than French-Canadian colts and fillies of the same age generally weigh. To enable anybody to calculate the cost at present prices it may be said that the 3-year-old received the following quantities of feed: 1,260 pounds of skim-milk, 16 oil meal, 86 wheat, 4,184 bran, 5,393 oats, 9,954 hay. This shows that only good stock must be used for breeding purposes, as it costs a great deal to raise horses.

Cost of Feed of Working Horses: Two mares weighing, respectively, 1,140 and 1,285 pounds ate the following quantities of feed from November 1, 1916, to March 31, 1917: 3,373 pounds of hay, 3,313 pounds of oats, 704 pounds of bran, 180 pounds of molasses. At the above-mentioned prices it cost, for feed per mare, for five months,

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\$36.97. During that time they worked an average of 484 hours each, which brings the cost of work, for feed alone, to 7.6 cents per hour. When interest, depreciation, barn room, shoeing, blanketing, harnessing and care are taken into consideration, horse labour is, of course, much more costly.

Selling breeders at reasonable prices.—The stud of French-Canadian horses at Cap Rouge is, without doubt, the largest and best in existence to-day. About half a dozen youngsters are raised each year, and most of them are for sale at reasonable prices. Some have been shipped to New Brunswick and to Nova Scotia, besides Quebec.

SHEEP.—The flock comprises a 2-year-old ram, six yearling rams, sixteen breeding ewes, five shearling ewes, and twenty lambs, all pure-bred Leicesters. These are kept for experimental feeding, experimental housing and to sell breeders at reasonable prices.

Experimental Feeding.—The work undertaken is to find out how much feed it takes to carry a breeding ewe over the winter. In 1916-17, it took 2.95 pounds of hay, 0.47 pound of pea straw, 2.12 pounds swede turnips, 0.75 pound oats, 0.16 pound bran per ewe per day. The ewes experimented with were Leicesters of about average weight, and fifteen of them raised nineteen lambs. If breedings ewes are fed about 200 days, to give a chance to pastures to start in the spring, it will cost about \$5.85 per head for feed, to winter them, calculating hay at \$7, straw at \$4, swedes at \$2 per ton, oats at 1.5, and bran at 1 cent per pound.

Experimental Housing.—Many farmers are deterred from breeding early lambs because they are under the impression that these have to be kept in warm quarters for a long time. According to experiments made at this Station, a lamb can withstand a great deal of cold when from two to six days old. Every one dropped in March was sent up with its dam, when of the above-mentioned age, to a single-boarded shed; they all grew well, and were always healthy.

Selling breeders at a reasonable price.—The Leicester is very popular in this district, and rams are eagerly picked up as soon as available for sale. Careful records are kept, and poor or shy breeders are sent to the butcher. Moreover, the weight of fleeces is kept, also samples, so that the improvement made by different rams is noted. It is the aim that only good breeders should be bought by farmers who apply to the Cap Rouge Station.

POULTRY.

Barred Rocks are kept; 312 layers were wintered, and 779 chicks were raised. For the latter, 2,617 eggs were used, out of which 505, or 19 per cent, were not fertile, whilst of the remainder 1,162 or 55 per cent did not hatch out. Of the 950 chickens placed in the brooders, 779, or 82 per cent, were raised. The percentage of chicks raised from the total number of eggs was 30, and from the fertile eggs, 37. It took 3.3 eggs per marketable chicken.

Experimental Breeding.—This consisted in comparing pullets with hens; also heavy with light layers as producers of hatchable eggs.

Pullets versus Hens as Breeders.—The result of one year shows that 100 eggs from late pullets gave 42.4 strong chicks, whilst early pullets gave 40.8, yearlings 38.6 and 2-year-olds 28.2. This is contrary to expectations, and the experiment will be continued.

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Heavy versus Light Layers as Breeders.—Four pens were used. One of them laid 555 eggs in four months and the others 545, 154, 16. The strong chicks hatched from these eggs were, respectively, 390, 231, 59, 5, which shows that the percentage of hatchable eggs was larger from the good layers than from the poor ones. This also, seems surprising, and the experiment will be continued.

Layers of different ages.—The average of two years shows that during November, December, January, February, early pullets produced eggs at a cost of 18 cents, late pullets 56 cents, yearling hens 83 cents, and old hens \$5.59, per dozen. A remarkable thing is that the pen of 25 yearlings used in 1916-17, when each lost 40 cents during the four winter months, was, with two exceptions, composed of the same birds which, as early pullets, had given a profit of 89 cents per bird during the four corresponding months of 1915-16.

Experimental Feeding.—Four experiments were made to compare different kinds of feeds and methods of watering.

Skim-milk versus Beef Scraps: All feed given to two pens of birds was the same, except that one received skim-milk and the other beef scraps. In four months, the 25 birds in the "skim-milk" pen produced \$6.15 worth more of eggs and meat (increase in live weight) than the others.

Roots versus Clover: All feed given to two pens of birds was the same, except that one received dry clover leaves and the other swedes. The latter pen of 25 birds was \$1.81 ahead at the end of the four months.

Commercial Grain versus Separator Screenings: Two pens of 25 birds each were fed alike, except that one received commercial grain and the other separator screenings. The latter were valued at two-thirds the price of the former, and were \$1.97 ahead at the end of the four months.

Water versus Snow: Both lots were fed absolutely the same quantities of feed; one of them received water and the other snow. The pen of 25 birds, which received water, was \$2.19 ahead at the end of the four winter months.

Experimental Housing.—The range of mean temperature, during the winter of 1916-17, was 40.0° F., outside, 19.2° in a colony house 8 feet wide, 16.7° in a laying house 12 feet wide, and 15.1° in a laying house 16 feet wide. All styles of houses were the same, and they only differed in width. It would seem that the widest house had the most equable temperature.

Miscellaneous.—Four different lots of eggs were preserved in as many ways: the two lots in lime-water and in water-glass were in excellent condition and quite good about five months afterwards, whilst the two lots, simply wrapped in paper, one lot of which was turned daily, were decomposed and not fit to be used.

BEES.

The bees kept at Cap Rouge are hybrids between Italians and Blacks. They are kept for commercial and experimental work.

Commercial Work.—The total production of honey from thirteen hives, spring count, was 1,218 pounds, so that the average per colony was 93.69 pounds. The highest yield from a colony was 131 pounds, and the smallest 65. The colonies ranged in weight from 58 to 76 pounds when placed in the cellar on November 13, 1916, and averaged 64.2 pounds, whilst they ranged in weight from 43 to 74 pounds and averaged 55.5 pounds when taken out on April 13, 1917. Most of the loss occurred after the first of March.

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Experimental Work.—This deals specially with feeding and housing.

Experimental Feeding: The bees wintered on early-gathered stores lost an average of 11.5 pounds per colony during the winter, were in good to very good condition in the spring, and covered an average of 7.5 spaces when taken out, whilst the ones wintered on late-gathered stores, on honey and sugar syrup, and on sugar syrup alone, respectively, lost 3.7, 4, 6 pounds, were all in excellent condition, and covered 9.3, 10, 10 spaces in the spring. This is quite the reverse of what was expected, and the experiment will be continued.

Experimental Housing: At the beginning of December, wet sand was placed on the concrete floor of the bee cellar, and sprinkled occasionally. This, however, had to be discontinued about the middle of January, on account of the offensive odour from dead bees. Afterwards, a great deal fewer bees died.

FIELD HUSBANDRY.

The work done in this division comprises crop management and agricultural engineering.

Crop Management.—Under this come crop yields, cost of production of field crops, rotations and experimental work.

Crop Yields.—The yields were lower for oats, corn, and swedes than usual, but much higher for hay. Longfellow corn yielded at the rate of 6 tons 314 pounds per acre; Good Luck swedes, 14 tons 22 pounds, Banner oats, 50 bushels (of 34 pounds) and 19 pounds; clover hay, 2 tons, 1,968 pounds; timothy hay, 2 tons, 1,505 pounds.

Cost of Production of Field Crops.—The results of four years of accurate record keeping show that it cost \$2.29 per ton to grow swedes, \$5.32 per ton for hay, and 30.6 cents per bushel of 34 pounds of oats.

Rotation of Crops.—A three year rotation has been run six years, and during that time a loss of \$5.92 per acre has been transformed into a profit of \$3.42, which is a gain of \$9.34 per acre.

Experimental Work.—Five projects are under investigation, as follows:—

Planting Fodder Corn in Drills vs. Hills: After five years, it has been found that the drills 48 inches apart give 20,819 pounds of green corn, with 1,176 pounds of nutrients per acre; drills 42 inches apart, 19,887 and 1,026 pounds; hills 36 inches apart, 12,402 and 691 pounds; hills 42 inches apart, 12,356 and 644 pounds. When sown thickly, a variety of corn must be used which would bring ears to the glazed stage, were it sown thinly. If the ground is very weedy, hills are better, so that cultivation can be given both ways.

Rates of Seeding Oats: Thirteen different rates from 1 to 4 bushels per acre have been tried for four years. The average for the six rates below $2\frac{1}{2}$ bushels per acre was 1,845.3 pounds of grain per acre, that for the six rates above $2\frac{1}{2}$ bushels was 2,039.3, and that for the rate of $2\frac{1}{2}$ bushels was 2,039, the second highest yield. This was on a sandy loam.

Yield of Hay when Nurse Crop is sown at Different Rates: Oats were sown at thirteen different rates from 1 to 4 bushels per acre for four years, and the hay weighed the next year from each plot. There was more hay when the crop of grain was the heaviest, that is from the seedings above $2\frac{1}{2}$ bushels per acre, contrarily to expectations. The second largest crop of hay was after the standard rate of seeding of $2\frac{1}{2}$ bushels of grain per acre.

Rates of Seeding: Since 1912, inclusive, 100 plots of 1-60 acre each have been used for this experiment, on half of which 12 pounds of timothy, 8 pounds red clover,

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and 2 pounds of alsike were sown per acre, with oats as a nurse crop; whilst the others only received half of these quantities. The thick seeding gave 13 per cent more hay.

Yield of Hay with different Nurse Crops: Since 1912, inclusive, all the trial plots of grain, 102 in number, were seeded down to timothy and clover. The soil is a sandy loam not well adapted to hay, but this does not affect comparative results. After barley, the crop of hay averaged 4,144 pounds per acre; after wheat, 3,954; after peas, 3,897; after oats, 3,570.

FERTILIZERS.

Five acres are devoted to experiments with fertilizers on 130 different plots. There are now six projects under investigation.

The most effective formula.—Different combinations of the three main elements, nitrogen, phosphoric acid, and potash, are used in a three-year rotation of potatoes, oats, clover. This experiment has run two years, and the most important finding was that, on a clayey loam such as was used, the least important element was potash.

Comparative values of different forms of nitrogen and phosphoric acid when there is enough potash.—In a three-year rotation of potatoes, oats, clover, nitrate of soda has proved superior to sulphate of ammonia for the two first-mentioned crops, and so has superphosphate shown its superiority over bone meal and basic slag, which were of about equal value.

Manure vs. clover as a source of humus.—The results of one year, for a crop of oats, have shown an increase of 23 per cent grain and 33 per cent straw from the manured plot. This experiment is to run about six years, at the end of which samples of soil will be examined and analysed for their humus content to compare with the ones taken at the beginning.

Comparative value of different elements as supplements to farm manure.—This is to throw some light on the problem of using part manure and part fertilizers. One of the main results, though, after only one year's test on oats, was that the complete fertilizer increased the crop by 50 per cent, whilst nitrogen or potash each only increased it by 25 per cent.

Burnt lime vs. ground limestone.—On oats, ground limestone applied at the rate of 7,500 pounds per acre at seeding time practically gave no increase, whilst burnt lime applied at the same time at the rate of 4,200 pounds per acre increased the grain by 9 per cent and the straw by 16 per cent. It will be interesting to watch the residual effects of the ground limestone on the hay.

Value of ground seaweed as a fertilizer.—The results of two years, on potatoes and oats, show that 100 pounds of nitrate of soda was equal to 930 pounds of ground seaweed, 100 pounds of a 2-2-5 mixture of acid phosphate and basic slag was as good as 736 pounds of ground seaweed, and 100 pounds of muriate of potash gave as good results as 1,920 of ground seaweed. There are yet to be recorded the after-effects on clover hay.

CEREALS.

The work with cereals at this Station comprises tests of varieties, the isolation of good strains, the growing of grain for hay, and the production of seed for sale.

Variety tests.—Nine varieties of spring wheat were tested, and the result of six years places Huron at the head; eight varieties of oats were in the test plots, and Banner shows up on top after five years; five varieties of field peas are led by Arthur at the end of five years; of the eight varieties of barley tried, Manchurian is recommended.

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Selection of best strains.—That some strains are better yielders than others is shown by the fact that the comparative yields of the lowest and highest, for Manchurian barley, was as 100 to 163, for Arthur peas as 100 to 133, for Huron wheat as 100 to 133.

Growing of grain for hay.—The results of two years show that oats alone, or oats and peas, or oats, peas, and vetches not only give a higher tonnage of hay than clover and timothy or timothy alone, but also give more dry matter per acre. The hay from oats and peas, or oats, peas, and vetches contains more protein, and is thus more valuable than that from clover or timothy.

Production of seed for sale.—Huron wheat, Manchurian barley, Arthur peas and Banner oats are the varieties recommended for this district, and are grown for seed. This is cleaned and separated by modern machinery and shipped in sealed bags so as to avoid substitution. Prices are given to inquirers on application. This seed is of a very high grade, and has never yet disappointed a single buyer.

FORAGE CROPS.

Investigations with forage crops consist in testing varieties, selection of good strains, and comparison of different methods of helping the germination of mangel seed.

Variety tests.—Longfellow has been found one of the best corns for silage, whilst the results of six years place Good Luck at the head for swedes, Giant Yellow Intermediate for mangels, and Improved Short White for carrots.

Isolation of best strains.—Work of this description was continued with Indian corn, swedes, Kentucky blue grass, meadow fescue, orchard grass, perennial rye grass, red top, sheep fescue, timothy, western rye grass, alfalfa, and red clover.

Helping the germination of mangel seed.—Fertilizer, also salt, mixed with the soil or sown in the row, did not compare at all favourably with seed soaked for twelve hours in water, or in water and liquid manure. Watering, or even only packing, the soil had nearly as good an effect as soaking the seed. This experiment is only the result of one year, and not yet conclusive.

HORTICULTURE.

There are three lines of investigation with flowers, fruit, and vegetables: testing varieties, cultural experiments, propagation of the best kinds. There was, in 1916, over 20 acres used for this purpose.

Testing varieties.—The following numbers were tested in 1916: apples 150, cherries 15, pears 4, plums 40, grapes 24, black currants 16, red currants 12, white currants 3, gooseberries 12, raspberries 11, strawberries 34, potatoes 20, vegetables 221, ornamental plants 1,031. As there are at least four examinations to be made each season, this takes considerable time, just for the records.

Cultural Experiments.—These were made for apples, strawberries, beans, beets, cabbage, carrots, cauliflower, celery, onions, parsnips, peas, rhubarb, tomatoes.

Propagation of the best varieties.—Some of the most promising varieties of apples, plums, grapes, currants, gooseberries, strawberries, raspberries, are being propagated. Seed is grown of all vegetables that do well in the district, with the exception of cauliflower and celery; and in many cases the Cap Rouge strain has proved superior to all commercial ones.

SPECIAL CROPS.

Flax.—An acre of flax was grown for fibre; it was found that pulling the plants is a very long job, and quite costly when done by people who are not used to such work. If the land is at all weedy, it seems impossible to grow this crop with profit.

Tobacco.—Three varieties were grown: Canelle, Comstock, and Petit Havana. The latter is such a low yielder that it is not recommended for this district, though it is very early.

FARM IMPROVEMENTS.

Buildings.—Building operations were practically suspended during the year, only a couple of sheds for horses and sheep being erected.

Clearing Land.—This consisted mostly in clearing odd places of obstructions such as trees, stumps, stones, so as to facilitate the use of implements.

Draining.—It is practically impossible nowadays to get men to work at this, and only small areas were tiled in 1916, where they interfered with the use of the four-horse machines which are now used at this Station.

Fencing.—This received much attention, and a cross-road behind the orchards was fenced, the intention being to have two other of these roads so that visitors can drive around and see everything without having to get into the fields.

Roadmaking.—Most of the improvement work was done here. Quite a number of concrete silt basins were made to take away surface water from ditches, in hollows, and were connected with the nearest drain.

EXHIBITIONS.

The work for this division consists in distributing literature and in staging exhibits at fairs.

Distributing literature.—This is done from the Station, at fairs, and also by sending to Ottawa the addresses of interested persons. A great many names were thus added to the mailing lists.

Exhibitions.—Exhibits from the Station were sent to the following fairs: Three Rivers, Quebec, Lotbinière, St. Tite, St. Casimir, besides to five different ones in the New England states, the latter through the Department of Interior. Diplomas were secured at four places.

VISITORS.

There were three excursions to the Station during August, 1916, from different counties of Central Quebec, and the total number of visitors was 2,422.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

THE SEASON.

The light snowfall, frequent thawing and hard freezing during the winter of 1915 left much frost in the ground, preventing very early seeding.

The first wheat was sown on the 3rd of May and the general grain crops were sown the following week, on land which had been underdrained the previous year.

The heavy rainfalls of the latter half of May and the month of June made it almost impossible to get land in shape for corn. This crop was only planted June 16, and made very slow growth up to September 1, but with the warm sunny days of that month much progress was made, and a fair crop harvested.

The weather during the winter of 1916-17 has been an exception in this district as there has been no thaw to take away the snow, which came the middle of December, until March 24. Steady, cold weather has prevailed throughout the winter, the thermometer registering below zero twenty-two days in the month of February.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperatures.				Precipitation.			Total Sunshine.
	Maximum.		Minimum.		Rainfall.	Snowfall.	Total.	
1916.	Date.	Deg.	Date.	Deg.	• Ins.	Ins.	Ins.	Hours.
April.....	25	68	3	18	2.34		2.34	174.8
May.....	29	80	10	23	4.20		4.20	155.0
June.....	2	79	2	35	4.72		4.72	180.1
July.....	20	90	15	41	5.68		5.68	250.5
August.....	19	91	2	40	3.91		3.91	227.3
September.....	7	80	11	32	5.64		5.64	133.2
October.....	5	78	12	22	2.59		2.59	149.5
November.....	9	65	17	0	2.67		2.67	74.8
December.....	6	49	30	-30	0.74	15.9	2.33	72.4
1917.								
January.....	14	43	20	-40	0.86	27.3	3.59	69.5
February.....	18	40	13	-36		8.5	0.85	105.5
March.....	26	53	7	-20	0.85	7.5	1.60	153.4
					34.20	59.2	40.12	1,746.0

LIVE STOCK.

Horses.—This Station now has twenty horses; six registered Clydesdale mares, eleven well-graded work horses, one driver, one registered Clydesdale stallion two years old and one filly foaled in the fall of 1916.

Four of these horses were wintered in the yard, with a loose box stall to run into. They were fed on a ration of 20 pounds of swedes and 28 pounds of hay per day, which makes a very economical way of wintering idle horses, and at the same time giving them plenty of exercise. The horses held their normal weight throughout this experiment.

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These horses were put in the barn on March 23, and received a light grain ration of two parts oats to one part bran. They were given light work to prepare them for seeding operations.

The horses wintered outside cost 13.3 cents per horse per day to feed. Those kept inside, which were fed a light grain ration throughout the winter, cost 19.5 cents per horse per day.

Beef Cattle.—Eighty-nine 2-year-old grade Shorthorn steers were purchased locally in October, 1916, and were put on feed November 9. The year was exceptionally good, the spread between cost and selling price per hundredweight being \$4.83. The average profit per steer was \$39.61. Twenty of the steers were divided into two lots, one being fed loose in box stalls, the other lot being tied. The profit per steer "loose" was \$40.23, and "tied" \$39.62.

Sheep.—There are now at the Lennoxville Station, fifty-eight sheep, nine of which are registered Oxford ewes, three registered Oxford shearlings, one registered Oxford ram, thirty-five grade ewes, and ten shearling ewes.

The wool clip was sold in the spring of 1916, for 43 cents per pound; average weight of fleece, 8.13 pounds.

Surplus lambs were sold, and a sale was also held of registered rams for breeding purposes.

FIELD HUSBANDRY.

Rotations.—Work with rotations has not yet commenced at this Station, owing to the necessity of first working the land into suitable condition.

Crop Yields.—The hay crop was an average one, with a high percentage of clover in meadows seeded the previous year. The seeding mixture used on the Station was 9 pounds red clover, 2 pounds alfalfa, and 10 pounds timothy, per acre. The yield of hay was 250 tons. Clover seed production was given considerable attention, and 200 pounds was saved and threshed in the fall of 1916. This work has aroused considerable interest among the farmers of the district, many of whom are now growing and sowing their own clover seed.

The grain crop was below average, owing to excessive spring rains and extreme heat in August.

Fifty acres were planted to Indian corn on June 20, on old sod land. The heavy rainfall during May and June prevented earlier sowing, and a heavy yield was not hoped for. However, three large silos were filled, furnishing sufficient winter silage for 89 steers, 23 dairy cattle, and 58 sheep.

Two acres were sown July 1 to rape for fall pasture for sheep and lambs. The results were excellent, and every farmer is advised to sow at least a small area for this purpose.

FERTILIZER EXPERIMENTS.

The special work with fertilizers was begun this year on a three-year rotation, consisting of turnips, grain, hay. The objects in view are: (1) to ascertain the quantity and proportionate composition of a fertilizer which will yield the greatest profit; (2) to ascertain the relative efficiency of different sources of nitrogen and phosphoric acid; and (3) to ascertain the fertilizing value of a nitro-potassic fertilizer prepared from seaweed. The work must necessarily continue for a period of years before definite conclusions can be drawn.

FORAGE PLANTS.

Owing to the extremely wet spring, it was impossible to carry on all the experiments with forage plants which had been planned for 1916. Among the experiments dropped were the variety tests of mangels and carrots.

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Thirteen varieties of Indian corn for ensilage were grown. The highest yield was obtained from Wisconsin No. 7, 15 tons 1,600 pounds; and the lowest from Free Press, 5 tons 1,275 pounds.

Eighteen varieties of field turnips were tested. The highest, Good Luck, yielded 20 tons 850 pounds per acre; and the lowest, Corning's Lapland, 12 tons 450 pounds.

Clovers and grasses.—Alfalfa, Grimm's Variegated, was sown in drills 2½ feet apart, and was also sown broadcast with a crop of wheat. There was a marked difference in the growth, the alfalfa sown in drills being much more vigorous and sending its roots down more deeply.

The following plots of grasses and clovers are under test for hardiness and adaptability: Timothy, orchard grass, red top, Kentucky blue grass, meadow fescue, sheep's fescue, western rye grass, perennial rye grass, red clover, Swedish clover, and alsike clover.

All wintered satisfactorily with the exception of the perennial rye grass, which completely winter-killed.

HORTICULTURE.

Fruits.—The fruit trees in the cultural orchard made remarkably good growth in 1916. There was, however, some injury during the previous winter, about 20 per cent of the trees being seriously damaged. Ninety-three trees were replaced.

In the variety apple orchard, the trees wintered fairly well, and made good growth.

The standard plum trees planted in the spring of 1915 have not done very well so far, but the seedling varieties have made strong growth and are developing into good trees.

Some of the seedling pear trees have wintered well; others were badly injured or killed. The pear trees have been moved to another site, where the soil is heavier and more protection from wind is afforded.

The small fruit crops were light in 1916, owing to the plants being young and not sufficiently established.

Vegetables.—Tests were conducted with the following varieties of vegetables: lettuce, radish, garden peas, parsley, beans, parsnips, cucumber, sweet corn, carrots, beets, leeks, onions, cabbages, Brussels sprouts, cauliflower, peppers, watermelon, muskmelon, citron, pumpkin, squash, celery, tomatoes, and potatoes. With some of these, experiments were carried on as to dates of sowing, distances of thinning, protection of plants from insect injury, methods of blanching (celery), methods of training and ripening (tomatoes). With potatoes, trials were made in planting different kinds of sets, at different distances between sets and rows, methods of cultivation, etc., and a commencement was made in potato selection work.

Ornamentals.—The area for the main lawn was graded, smoothed, and seeded, and the lawn fencing erected. The demonstration hedges planted in 1915 made good growth in most cases. Two borders were planted in October, one of perennials, the other part perennials and part shrubs. The annual flowers bloomed fairly through the season, and proved a great attraction to visitors.

FARM IMPROVEMENTS.

Buildings.—The erection of the new dairy barn at this Station was commenced in September, and completed on the 23rd of December. This barn is 37 feet wide by 94 feet in length, with feed room attached, 20 by 30 feet, and one silo, 17 by 30 feet; also a cooling room for milk. The barn will accommodate 46 head, with an abundance of light and the best of ventilation.

Necessary repairs were done on the old buildings in use at this Station.

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Fencing.—Two hundred and fifty rods of 48-inch high, No 9 galvanized wire fencing, was erected on the farm roads and other parts of the farm during the summer and fall. There was also erected 1,225 feet of lawn fence around the horticultural area.

Drainage.—The underdrainage system already laid gave satisfaction, as it permitted of raising a good crop of grain on the land which, with the excessive rains this past season, could not otherwise have been cropped.

During the season, 75,000 feet of underdrains were installed, located as follows: 60,000 feet on the R. W. Reid farm; 2,000 feet in the variety orchard; 13,000 feet on the Ed. Read farm. These systems are working satisfactorily, as demonstrated by the fact that this land can now be worked much earlier in the spring.

Roads.—The public roads leading through the farm were kept in good condition during the summer of 1916, and in the winter 1916-17 gravel was drawn and spread on the farm road leading past the new dairy barn for a length of 125 rods. The road leading from the Cockshire road towards the brick-yard was also gravelled.

EXHIBITIONS.

The Experimental Farms' exhibit was shown at Brome, Ayer's Cliff, and Sherbrooke. Much interest was manifested by visitors at all these fairs, the demand for publications was brisk, and a large number of names were added to the mailing lists.

MEETINGS.

On the 12th of August there was organized a Farmer's Day for this Station, when invitations were sent out to all the farmers and their families in the Eastern Townships. The response was very encouraging; over one thousand people assembled at this meeting, at which were present the Hon. Martin Burrell, Minister of Agriculture; J. H. Grisdale, Director, Dominion Experimental Farms; J. A. Simard, B.S.A., of the Seed Branch; and others, who gave practical addresses on agricultural subjects.

The staff have also attended a number of agricultural meetings in different sections of the Eastern Townships throughout the winter.

VISITORS.

During the past year there has been a marked increase of visitors, who showed much interest in the different lines of work being conducted at the Station.

The farmers are coming more to realize the advantage of adopting more systematic methods in the rotation of their crops, the cultivation of the same, selection of their seeds, the guarding against plant diseases and insects, and the selection, breeding, feeding, and housing of their live stock. Much interest was shown by the ladies and townspeople in the garden work.

EXPERIMENTAL STATION, SPIRIT LAKE, QUE.

REPORT OF THE FOREMAN-MANAGER, P. FORTIER.

ESTABLISHMENT OF THE STATION.

An internment camp for alien enemies was opened at Spirit Lake, on the site of the proposed Experimental Station, in January, 1915. At that time, except for the land belonging to the Transcontinental Railway, what is now the Experimental Station was, like all the Abitibi district, densely wooded, the chief forest trees found there being the spruce, white birch and aspen. The first clearing work was done by the prisoners.

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Some 155 acres have now been cleared, and 150 acres of this area has been prepared for cultivation. The greater part of the wood obtained from this clearing work has been sold as pulp-wood, about 2,500 cords having been cut. In September, 1916, the foreman-manager took charge of the administration of the Station, but it has only been since January, 1917, when the internment camp was removed, that the work has been entirely under the control of the Department of Agriculture.

SITUATION AND AREA.

The Station is situated between the 48th and 49th degrees of latitude and the 78th and 79th degrees of longitude, in the townships of Dalquier and Trois-Rivières. Its altitude is about 1,000 feet.

This land was the property of the Provincial Government of Quebec, which deeded it, for a nominal sum, to the Federal Department of Agriculture, with the understanding that the area is to be used for Experimental Farm purposes. The area so far transferred is about 1,200 acres, which may later be increased to some 1,600 acres in all. Not all of this land is arable, there being a considerable frontage of Lake George included, which will probably be made into a sort of park or forest belt.

SEASONAL NOTES.

It is impossible to give precise temperature records for this Station during the past year, as no meteorological instruments were available. The spring opened early, but excessive rain from May 5 to June 15 made it impossible to do much work on the land. The weather was, however, dry from July 1 to August 15.

LIVE STOCK.

Horses.—There are twenty head of horses on the Station, eighteen of which are work horses, and the other two drivers.

Cattle.—Four cows, two Holsteins and two Ayrshires, are kept at the Station for the purpose of supplying milk to the employees.

POULTRY.

A start has been made with poultry, some seventy Plymouth Rocks being kept, most of which are doing well.

FIELD HUSBANDRY.

Seventy acres were sown to oats, 20 acres of this area being seeded to clover; 2 acres were sown to turnips, and 2 acres to beets. The crop of oats was excellent from one field of 10 acres, one area of one and a half acres yielding 150 bushels. Twenty tons of unthreshed oat straw were used as feed for the live stock.

HORTICULTURE.

Fruits.—Several varieties of apple and plum trees, currant bushes and raspberry canes have been planted during the last eighteen months, but their growth has been feeble. It will be necessary to transplant them, as the soil where they were planted is not deep enough, being very stony; in fact, several trees have died.

Vegetables.—One acre was devoted to vegetables; the yields were very good.

Ornamental Gardening.—Several varieties of annual flowers were sown, and grew very well. There is little doubt that perennials will be able to stand the rigour of the winter at this Station.

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BUILDINGS.

All the buildings erected by the military authorities are still available, but as most of them are of only a temporary character, these will have to be torn down and re-built, except the water tank, the barn, the foreman-manager's house, and the five cottages at the edge of Spirit Lake, and even these will need extensive repairs before being of permanent use. During the year, a greenhouse, a small stable at the back of the barn, a pump-house, and a small poultry-house have been constructed, and one of the shacks has been remodelled as a horse barn.

WATER SUPPLY.

The water supply for all the buildings on the Station is obtained from Spirit Lake, and is pumped into a reservoir of 30,000 gallons capacity, by a pump driven by a gasoline engine.

CLEARING OPERATIONS.

During the fall, winter, and spring of 1916-17, 965 cords of pulp-wood were cut and hauled to the railway siding on the Station ready to be shipped. In the same period, 75 acres were cleared.

EXHIBITIONS.

Various farm products, grown at the Spirit Lake Station, were exhibited at the Amos fair, last fall.

EXPERIMENTAL STATION, KAPUSKASING, ONT.**REPORT OF THE FOREMAN-MANAGER, S. BALLANTYNE.**

ESTABLISHMENT OF THE STATION.

Just four months after the European war broke out, several colonist cars were shunted into a lonely siding at MacPherson station, New Ontario. All that MacPherson could boast of then was its station and water tank, a shack or two besides, and the deserted camps of the T.C.R. survey party on the banks of the Kapuskasing river. Nothing then could be seen from the station but dense spruce forests rolling away to the sky line in every direction.

This isolated station on the Kapuskasing river was chosen as a camp for the interning of alien prisoners. By an arrangement between the Department of Militia and the Department of Agriculture, it was planned to utilize the prisoners' labour for the purpose of cutting down the timber and clearing the land for a Dominion Experimental Farm and for opening up and starting development in this portion of the great clay belt.

The Kapuskasing camp and the Experimental Farm had its beginning on December 14, 1914, when Lieut. Swain and his men of the 19th regiment of Kingston, with fifty-four prisoners, were shunted into the siding overlooking the turbulent river. On Christmas Day over 100 more prisoners arrived under the escort of the Governor General's Body Guard of Toronto.

With this number of prisoners the camp began to grow by leaps and bounds, trees began to disappear, the land became cleared, buildings began to go up, and MacPherson became the nucleus of a thriving camp; the farm was being slowly carved out. Every week or so numbers of prisoners arrived both from the east and the west, and gave fresh impetus to its growth and development.

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To-day when one steps off the train at MacPherson, south of the track a veritable farm of over 700 acres can be seen, the timber seeming to have disappeared as if brushed away by magic.

On this farm spread along the right bank of the river lies the camp, the buildings being laid out in the form of a military square, while behind the station north of the track lies a little village of mushroom growth, the married quarters of the soldiers in camp.

As one enters the camp south of the track he passes a cluster of buildings belonging to the commissariat, and the regimental institute or soldiers' canteen. On the right side of the square on entering lie the numerous bunk-houses of the prisoners, the barracks of the soldiers, and the hospital buildings, while on the left lies the guard-house, the large recreation building of the soldiers, the blacksmith shops, the tool-house, carpenter shop, the buildings of the sergeants' mess and the administration or office building for the camp; while the officers' bungalow or residence overlooks the intervening space from the extreme end of the square, which is used as a parade ground.

DESCRIPTION OF STATION.

The farm comprises 1,280 acres of land, the whole being comparatively level, with gentle slopes toward the river. There are very few coulees or ridges in the total area.

Since operations began here in the fall of 1914 there have been 700 acres of timber slashed down; of this area, 150 acres have been cleared, and 120 acres roughly stumped. There is practically then only about 250 acres fit for agricultural purposes the coming summer, the remainder of the slashed area needing to be picked up, burned and stumped, while the rest of the farm has still its dense growth of standing timber.

Soil.—The land cleared has a soil of great fertility, being a rich, heavy clay loam, with a top soil of black muck.

Drainage.—The farm has natural drainage, the land being slightly undulating, with a gentle slope towards the river. The system of artificial drainage is not complete as yet, but there has been over 1,000 feet of drains laid down around the farm, while the office and stables have a sewage and drainage system of 3-inch tile laid at a depth of 3 feet, which runs into 6-inch mains that conduct the sewage to the river.

LIVE STOCK.

The live stock at this Station consists, at the end of March 1917, of fourteen horses. These have been used in the general farm work.

FIELD CULTIVATION.

Last year about 50 acres of rough land were sown to oats, the yield from which was very favourable, considering the condition of the soil. The crop was cut green and fed as roughage to the stock on the farm.

This coming spring it is hoped to have at least 150 acres prepared for crops.

HORTICULTURE.

The first year the camp was opened, that is during the spring and summer of 1915, several acres of land along the river bank was planted with such vegetables as potatoes, carrots, onions, parsnips, lettuce, and radishes, which reached their maximum growth. In the summer of 1916, several small fruit trees and bushes were planted, some of which should be productive this coming summer.

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BUILDINGS.

The farm buildings so far erected comprise the main barn, which in itself includes the cow barn and the horse barn, four other buildings, the office, stableman's house, pump-house, and the carpenters' shed.

The main farm building or barn is equipped with the Rutherford system of ventilation, and in construction throughout is similar in design to the barns at the Central Farm at Ottawa. The cow barn, size 38 by 100 feet, has accommodation for forty head of cattle, is to be finished in concrete, and is equipped with stampions and truck manure carriers. The horse barn is situated at the south end of the main building, has fifteen single stalls and two box stalls, besides a harness room. Between the cow and horse barns at the north end of the buildings are the feed room and calf stalls. This main building is not completed as yet, but this coming summer should see all building operations on the main barn finished.

WATER SUPPLY.

The water supply to the farm is pumped from the river by a gasoline engine to the large storage tank at the barn, which has a capacity of 35,000 gallons. From this tank the water is distributed to the farm buildings through 2-inch mains.

FARM OPERATIONS.

Eighteen cars of gravel loaded at pit 2, a distance of over 82 miles from the camp, were unloaded at the farm and used in the construction of buildings.

Over 850 cubic yards of rock blasted from an outcropping of rock at the river were hauled and piled at the barn to be used this coming summer.

In the fall of 1916 the mill operations, etc., produced a cut of 60,000 feet of lumber, while the past winter the mill cut 65,000 feet.

During the winter the teams on the farm have drawn over 125 cords of firewood for the farm buildings and the employees, besides drawing wood for the camp; and have also drawn out about 300,000 feet of timber, which will be sawn this spring.

EXPERIMENTAL STATION, MORDEN, MAN.

REPORT OF THE FOREMAN-MANAGER, CHAS. BOYLE.

SEASONAL NOTES.

The ground was not in workable condition until the end of April. The first half of May was cool and stormy, but the weather improved during the remainder of the month. Good growing weather was experienced in June, but hot weather, with scorching south winds, and a few damp days in July favoured the development of wheat rust. August was a month of fairly cool weather and heavy rainfall. The first frost occurred on September 15, and frost was also registered on the following two nights. Several inches of snow fell on October 17, followed by mild weather and bright sunshine until November 12, when the mercury dropped to zero. Real winter did not set in till December 9. The temperature dropped to 33 degrees below zero on December 19, and the first heavy snowfall of winter occurred December 26 and 27.

LIVE STOCK.

Horses.—Most of the horses at the Station are kept solely for farm work. A number of good grade Clydesdale mares are now included, however, and these will be used for breeding purposes. Four idle mares were fed during the winter on a

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daily ration consisting of 4 quarts oats, 1 sheaf corn, 1 sheaf oats, and 7 pounds hay, at a cost of 14½ cents per mare per day.

Cattle.—The work with cattle on this farm has so far been confined to the finishing of steers for market. Twenty steers bought in 1915 were sold in 1916 at \$8.75 per hundredweight. The average gain in weight during a feeding period of 204 days was 301 pounds, the average weight of the steers when sold being 1,321 pounds, and the net profit per head was \$16.28.

Thirty steers of very good quality were purchased in November, 1916, and divided into two lots for a feeding trial to compare the finishing of steers in a barn with those finished in a single-board shed and corral protected by a board fence. This experiment has not yet been completed.

Sheep.—A flock of 50 grade ewes was purchased in the fall of 1915 for breeding purposes. These have all been bred to pure-bred Hampshire rams of good type and quality. The flock at the present time numbers 72 head and is in excellent condition. During the past winter a feeding experiment to demonstrate the value of rusted wheat sheaves was commenced, but has not yet been completed.

FIELD HUSBANDRY.

Crop yields.—Eight acres of the 1915 summer-fallow were seeded down to Marquis wheat before the middle of May. Germination was excellent and the crop outlook very good until July, when the hot weather, combined with a certain amount of rain and dampness, produced a destructive attack of rust in the district. Not only was the grain badly rusted, but the top of each head of wheat was badly shrivelled, so that even without the rust, the crop would have been rather less than average. As it was, the wheat was not fit to thresh, and a quantity was stacked for feed, while some was burned in the field.

The remaining 20 acres of the summer-fallow were seeded to barley, cross-sowed, to eradicate any couch-grass that might be left. The crop was light.

An old brome pasture of 50 acres was seeded to oats. The yield was small, and the growth of straw light.

The 35 acres seeded down to western rye grass and red clover yielded a fairly good first crop. Nine acres of last year's corn and root patch was seeded to alfalfa in June, and gave an excellent catch. The field was cut once, to combat weeds.

About 8 acres were planted to field corn, which grew luxuriantly and yielded a good crop. The season was a very favourable one for corn, and should encourage farmers to grow corn for fodder more generally.

The remaining 60 acres of cultivated land were summer-fallowed. Fifteen acres were kept black all season, and 45 acres seeded to fall rye about September 15. The germination was good, and promises well for a good stand in the spring, especially as the snowfall during the winter has been quite heavy, giving good protection.

HORTICULTURE.

Marked progress in the horticultural work at this Station was made last season. Hot-beds were established, a horticultural area was fenced, and plots laid out. Outside sowing of garden seeds commenced about May 5.

For temporary protection from high winds and from snow drifts, rows of sun-flowers were grown round the tree nursery, the young orchard, and the vegetable plots. Permanent protection was also provided for by hedges of Siberian pea tree, *Caragana arborescens*, and laurel-leaved willow.

Fruits.—About 1,000 trees were planted in the orchard area in the spring of 1916. These made a healthy growth, and were in good condition when winter set in. Clean cultivation was followed in the orchard until the middle of July, when rape was sown.

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An area was also set aside for small fruits, and a number of varieties of raspberries, gooseberries, currants and strawberries were planted.

Vegetables.—Potatoes were not a heavy crop in the Morden district last year. Other vegetables grown were artichokes, beans, beets, Brussels sprouts, cabbage, cauliflower, carrots, celery, table corn, cucumbers, lettuce, musk melons, onions, parsnips, peas, pumpkins, radish, rhubarb, salsify, squash, turnips, and tomatoes.

The comparison of home-grown versus commercial seed will be conducted with a number of these.

Ornamental Gardening.—Further sowing and planting were done in the nursery, from which it is hoped to obtain most of the varieties of trees and shrubs required for the ornamental grounds at this Station. The season of 1916 was favourable for flowers, and an excellent display was obtained. Seed was collected from a number of varieties, and will be tested in 1917 in comparison with seed obtained from commercial sources.

FARM IMPROVEMENTS.

Buildings.—During the year an open shed and corral were put up for use in experimental work in feeding steers outside. A combined storeroom and tool shed, 12 by 20, was also built, and a small office building erected.

Fencing.—Over three miles of boundary fencing was put up; 3-foot cedar posts and No. 9 Page woven wire fencing, 51 inches high, were used, two strands of barbed wire being above the woven wire.

Machinery.—Some implements were purchased, including a corn harvester, a spraying outfit, and sheep-shearing equipment.

MEETINGS.

Mr. S. A. Bjarnason, Assistant in Horticulture, addressed several agricultural society meetings on horticultural and farming topics. He also took an active part in the work of the local horticultural society, and gave lectures and demonstrations to the pupils of the Morden high school.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1916 in Manitoba was chiefly noted for the most serious attack of rust in the history of the province. Up to July 20 conditions for crop growth had been rather better than the average, and at that time crop prospects were very good. The rust attack reduced the yield and quality of the wheat crop to the worst in over twenty years. Oats and barley were also seriously damaged. The hay crop was better than usual, and fodder corn was fairly good.

METEOROLOGICAL RECORDS, 1916-17,

Months	Highest Temper- ature F.	Lowest Temper- ature F.	Total Rainfall.	Total Snowfall.	Hours Bright Sunshine.
1916			Inches.	Inches.	
April.....	65.1	- 1.0	0.22	7.0	175.4
May.....	78.1	20.1	1.59		187.5
June.....	80.0	30.0	4.33		189.6
July.....	92.5	37.0	2.63		259.3
August.....	97.0	33.5	2.22		260.6
September.....	81.5	22.0	2.39		177.1
October.....	72.0	- 3.9	1.46	9.5	108.0
November.....	60.5	- 5.8		1.5	132.9
December.....	44.5	-40.2		9.0	115.3
1917.					
January.....	33.0	-49.0		20.0	88.7
February.....	30.0	-44.0		9.0	125.5
March.....	42.1	-27.0		1.0	123.5
Total.....			14.84	57.0	1,943.4

Reckoning 10 inches of snowfall as equivalent to 1 inch of rainfall, the total precipitation for the year ending March 31, 1917, was 20.54 inches.

LIVE STOCK.

Horses.—Twenty horses are kept on the Brandon Farm. Three colts were born during the year, one dying when a few days old. Three horses were wintered outdoors, being fed all the hay they could eat, and some oats in addition. All gained in weight, and did not appear to suffer from the cold.

Cattle.—A carload of steers was purchased in November. They were divided into two lots, both receiving the same feeds, except that one lot received oat sheaves and the other the same amount of cut straw and chopped oats. The steers fed cut straw and oat chop made average gains of 236½ pounds at a cost of \$7.96 per 100 pounds gain in weight; the lot fed oat sheaves made an average gain of 259 pounds at a cost of \$7.41 per 100 pounds gain.

Thirty-eight Shorthorns and four grades are kept at this Farm. Milk records were kept for all the cows that completed a milking period during the year. It was found that it cost \$41.16 to raise a heifer from birth to one year, and \$33.14 from one year to two years.

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Sheep.—The sheep at Brandon are Oxford Downs and grades. The lamb crop of 1916 was rather disappointing, only thirty-two lambs being raised. The sheep grading experiment was continued, and shows good results. The average wool clip was 9.2 pounds per sheep, or 646 pounds in all, and sold for \$214.28.

Swine.—Eighteen Yorkshires and twenty-eight Berkshires were kept. Experiments in feeding showed that the cost of feeding a mature sow for a year was \$26.32. Pasturing tests were also carried on with good results, and the self-feeder was used to good advantage. A comparison between pigs fed grain alone, digester tankage and grain, and buttermilk and grain proved the value of milk as a hog-feed, with digester tankage an excellent substitute.

POULTRY.

The poultry flock consists of birds of the White Wyandotte and Barred Plymouth Rock breeds. The birds are housed in six movable colony houses, each large enough to accommodate 25 to 30 hens. The hens laid moderately well all winter, but the pullets did not start to lay until February. During the winter all the birds were trap-nested, and records of the egg yield per hen kept. Hatching was started on March 30, but did not prove so satisfactory as in previous years. Portable houses were used for brooding chicks, and proved fairly satisfactory. After hatching was over, the cockerels were crate-fattened and killed.

BEES.

Of four colonies wintered outside, three colonies survived, and of twenty-two colonies wintered in the cellar, twenty-one were found to be strong when the spring examination took place, while the remaining one was queenless and weak. The total yield of extracted honey for the season was 1,350 pounds. Special attention was given to swarm control. The methods employed were very successful, and resulted in the issuing of only one swarm. The 10-frame Langstroth hive was used for the first time in the spring, and gave good satisfaction.

FIELD HUSBANDRY.

The work in field husbandry consists of crop rotations and cultural investigational work.

Rotations.—In connection with the rotations, records are kept as to the cost of production of different crops in the rotation. The following eight rotations were tested:—

“D,” four years’ duration (wheat, wheat manured, oats, summer-fallow): This is purely a grain-growing rotation, manure being applied every four years.

“E,” four years’ duration (wheat, wheat, oats, summer-fallow): This is exactly the same as “D,” except that no manure is applied.

“F,” five years’ duration (wheat, wheat, corn or roots, oats or barley, clover hay): This is a mixed farming rotation suited to conditions where it is desired to grow both a large quantity of wheat and a large amount of fodder for stock.

“G,” six years’ duration (wheat, wheat, oats and barley, clover hay, pasture, corn or roots): This also is a mixed-farming rotation and allows for one-sixth of the land being in pasture.

“H,” six years’ duration (wheat, wheat, summer-fallow, oats, hay, pasture): This rotation is suitable where grain growing is the principal undertaking, but hay and pasture are also required.

“I,” six years’ duration (flax, oats, summer-fallow, wheat, hay, pasture): In this rotation, flax is substituted for the wheat in the first year of “H.”

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"Q," eight years' duration (roots and peas, wheat or oats, hay, hay, pasture, pasture, pasture, green feed and rape): The land used in this rotation is poor, and is used as a sheep farm.

"W," ten years' duration (wheat, wheat, corn or roots, oats, barley, alfalfa five years): This rotation is adapted to a dairy or pure-bred stock farm, where the chief object in crop growing is the production of a large quantity of good fodder.

Crop Yields.—Wheat yielded from 5.1 to 20.3 bushels per acre, the attack of rust, of course, interfering considerably with the yields. The yields of oats varied from 26.5 to 68.3 bushels per acre, and of barley from 30.7 to 45.8 bushels per acre. Arthur peas yielded from 13 to 17 bushels per acre, and flax 14.9 bushels per acre. The yields of hay were fairly good; corn gave from 6.2 to 9.2 tons per acre, and mangels 15.4 tons per acre.

Cultural Experiments.—The following cultural work was under investigation during the year: Depth of ploughing summer-fallow and sod, summer-fallow and stubble treatment, seeding to grass and clover, breaking sod, application of barnyard manure, green manuring, seed-bed preparation, use of soil packers, commercial fertilizers.

CEREALS.

The yields of wheat were materially reduced by the disastrous rust attack, while the hot, dry, windy weather injured the oats and barley, even where they were not rusted; consequently the results from the year's work with cereals are of little value. Of three varieties of spring wheat, Marquis proved the highest yielder, with 32 bushels 30 pounds per acre. Eight of the Dominion Cerealists' varieties were also tested. Seventeen varieties of oats were tested in duplicate plots of one-fortieth of an acre each, Gold Rain giving the highest yield of 101 bushels 33 pounds per acre. This variety has given good results since first introduced, and also heads the five-year averages. Of the barleys, of which eight varieties were tested, Manchurian headed the list with 59 bushels 18 pounds per acre, and of the seven varieties of flax, Golden gave the highest yield of 20 bushels 30 pounds per acre. Mackay peas yielded at the rate of 41 bushels 40 pounds per acre. The experiment on the influence of environment on seed oats, conducted in co-operation with three United States experiment stations, was continued.

FORAGE CROPS.

The season of 1916 was moderately favourable for the production of forage crops. Hay was a good crop, and corn and mangels fairly good.

Indian Corn.—Seventeen varieties of field corn were tested, being planted on May 25 and cut September 9. Longfellow yielded 12 tons 854 pounds per acre, and the results from Northwestern Dent were also very satisfactory.

Roots.—Nineteen varieties of mangels and sugar beets were tested, and a comparison was also made between Canadian-grown and imported mangel seed, which showed that the home-grown seed was as good as the imported. Nineteen varieties of turnips gave an average yield of 13 tons 1,892 pounds per acre, and of three strains of sugar beets, the Ontario seed gave the highest yield, and also the highest percentage of sugar in the juice. The average yield of five varieties of carrots was 17 tons 140 pounds per acre.

Grasses and Clovers.—Thirteen kinds of grasses, clovers, and alfalfa were tested, and twelve mixtures of these crops were also tested under the same conditions. Baltic alfalfa, as in the previous year, gave the highest yield, 5 tons 1,120 pounds per acre.

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Three acres were sown to alfalfa for seed production. For annual hay production, green oats have been most satisfactory. A test was also made of crops suitable for the production of annual pasture, rape and common grain crops such as oats and barley being found to be the best.

HORTICULTURE.

Fruits.—The only kinds of apple tree that have proven themselves reliable at Brandon are the cross-bred varieties originated by the late Dr. Wm. Saunders. Most of these again bore plentifully this year. No standard apple trees of more than six or seven years of age on the Farm are in a healthy condition. A good crop of Manitoba native plums was produced. Ten varieties of currants, two of gooseberries, eight of raspberries, and three of strawberries were grown and compared.

Vegetables.—Variety tests with different vegetables were carried out, and cultural experiments continued. With potatoes, tests of varieties and experiments with various methods of cutting and planting the seed were carried on.

Ornamental Gardening.—The trees and shrubs did well this season, and there was no winter-killing of any consequence. Variety tests with herbaceous perennials, tulips, roses and annuals were also conducted.

BUILDINGS.

A disastrous fire occurred on December 6, 1916, destroying the cattle barn, horse barn, and implement building, together with large quantities of feed, machinery, and equipment of all kinds. This was specially unfortunate in regard to the cattle barn, as operations had just been completed in connection with the overhauling and modernizing of the lower portion of the barn. The stable had been completely altered and made convenient and modern. New concrete walls had been put in instead of the old stone walls, which were crumbling apart and had become dangerous. The new concrete walls stood the fire well, and were used for a temporary stable during the winter, and will be suitable for the support of a new barn. A temporary roof of boards and straw was placed on these walls, and stalls fixed up to provide accommodation for as many as possible of the live stock.

EXHIBITIONS.

Travelling exhibits of an educational nature and illustrating the Experimental Farm work were sent out to a number of agricultural fairs throughout Manitoba. The following fairs were visited during 1916: Carman, Neepawa, Roland, Miami, Morden, Carberry, Hartney, Manitou, Waskada, Deloraine, Souris, Treherne, Minnedosa, Cartwright, Pilot Mound, Crystal City, Melita, Reston, Hamiota, Roblin, Dauphin and Stonewall. A large exhibit of a similar nature, but more comprehensive, was shown at the Manitoba Provincial Exhibition at Brandon on July 17 to 21. A horticultural exhibit was also made at the annual show of the Brandon Horticultural Society.

MEETINGS.

The superintendent addressed the annual meeting of the Manitoba Swine Breeders' Association on "Hog Pastures." No other meetings were addressed this year, war conditions making the holding of farmers' meetings very difficult.

VISITORS.

It is estimated that about 7,500 persons visited the Farm during the year.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

THE SEASON.

The crop season of 1916 was most unsatisfactory for the production of cereal crops, in southern Saskatchewan. Forage and horticultural crops, however, produced large yields. Seeding of grain crops commenced April 24. High winds during the early part of May did considerable damage on the lighter soils, causing many farmers to reseed. Later in the season many sections suffered from the effects of hail and rust, which did inestimable damage to grain crops.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature.				Precipitation.				Total Sun- shine.
	Maximum.		Minimum.		Rainfall.		Snowfall.		
	Date.	°	Date.	°	Days.	Ins.	Days.	Ins.	Hours.
April.....	27	77	4	0	1	0.22	3	6	120.6
May.....	20	80	1	14	6	2.75	.....	.....	151.8
June.....	9	82	19	36	10	3.63	.....	.....	222.9
July.....	15	90	23	40	5	1.52	.....	.....	292.2
August	8	90	25	33	4	1.18	.....	.....	272.2
September	8	80	27	24	8	3.72	.....	.....	171.4
October.....	13	70	19	9	5	0.25	4	21	102.8
November.....	5	55	12	—15	.....	.....	2	2.25	72.5
December.....	3	42	20	—36	.....	.....	2	7.50	39.5
January.....	8	40	31	—43	.....	.....	7	14.50	39.2
February.....	6	34	2	—50	.....	.....	4	10.0	85.6
March.....	29	36	3	—30	.....	.....	4	4.25	111.8
Total for year.....	.....	.....	.....	.....	39	13.27	26	65.50	1,682.5

LIVE STOCK.

Horses.—The horses at Indian Head Experimental Farm are pure-bred and grade Clydesdales. In conjunction with the regular farm work considerable attention is given to breeding operations. During the past year three good filly foals were raised. The usual experiments were carried on relative to the cost of keeping work horses, cheap wintering of idle horses, together with the cost of raising 3-year-old fillies. The average cost of maintaining ten work horses from April 1, 1916, to March 31, 1917, was \$103.48 per horse.

Cattle.—The breeding herd at Indian Head consists of Shorthorns, the matrons at the present time conforming principally to the beef type. With the growing demand for dual-purpose cattle in Western Canada, much effort is being devoted to the production of a dual-purpose herd at the Farm, through the constant use of good dual purpose sires, and by paying the strictest attention to the dual-purpose type in the female. During the year a number of young bulls were sold for breeding purposes. Many of the cows, although conforming to beef type, are making very creditable

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records as milk producers. The average cost of raising a calf from birth to 1 year old was \$50.49, and of raising a heifer from 1 year old to 2 years old \$21.99 on this farm.

Sixty grade steers were purchased in the fall of 1916, and divided into four lots of 15 each, for the purpose of comparing the relative merits of the straw-stack shelter, open shed, open corral, and stable as winter shelters. Each group was fed the same daily ration, and all the hay they could eat. The grain ration was made up of wheat, barley, and pea screenings, ground into meal, together with a little bran to balance the ration. Notwithstanding the severely cold winter, the steers fed outside made comparatively better gains than those fed inside, and an average profit of \$17.52 per steer was realized on all lots.

Sheep.—The sheep flock at Indian Head Farm now numbers 83 and consists of pure-bred Shropshires and grades. The grading experiment which was commenced two years ago is still in progress. The cost of wintering breeding ewes was found to average \$3.96; the cost of wintering range ewes, \$3.85; and the cost of wintering ewe lambs, \$2.41. Fifteen of the best wethers were sold soon after weaning for 8½ cents a pound, realizing, on the average, \$5.78 each. Twenty poorer ones, for which 7 cents a pound was offered on October 5, were kept and sold for the Christmas market at 9 cents a pound, a profit of \$13.04 over feeding being realized.

Swine.—The swine at Indian Head number 31, Yorkshires, Berkshires, and grades. All the brood sows were wintered outside, and it cost \$8.45 to carry an aged brood sow, and \$7.68 to carry a young sow from December 1 to March 31.

POULTRY.

Work with poultry is increasing, the breeds kept being White Wyandottes and Barred Plymouth Rocks. During the year 444 chicks were hatched by artificial incubation. A Candeel coal brooder was used and gave entire satisfaction; it cost 19 cents a day for fuel while in operation.

The total number of eggs laid during the year was 11,985. Trap-nesting was carried on throughout the winter months. A pen of White Wyandottes laid 3,525 eggs, at an average cost of 15.4 cents a dozen. These were sold at an average price of 24.5 cents a dozen, thus leaving a profit over cost of feed of 9.1 cents a dozen.

A number of birds were caponized and allowed to run with the cockerels for a fattening period of three weeks, when it was found that they weighed from one to one and a half pounds heavier than the cockerels.

Seventy cockerels were crate-fed for three weeks and realized a profit over cost of feed for the fattening period of 43 cents per bird.

BEES.

The six colonies wintered in the cellar came through in good condition. Two swarms issued during the summer, but, being weak, were united with the parent colonies. The amount of honey extracted during the season was 303 pounds, and this was sold at 22 cents a pound, a profit of \$16.01 being realized.

FIELD HUSBANDRY.

Rotations.—The rotations carried on at Indian Head are as follows:—

Rotation "C," three years' duration (summer-fallow, wheat, wheat). This rotation is the most commonly followed in southern Saskatchewan. The main objections to it are the depletion of soil fertility and the facilitation of the introduction of weeds.

Rotation "J," six years' duration (summer-fallow, wheat, wheat, oats, seeded down, hay, pasture).

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Rotation "P," eight years' duration (summer-fallow, wheat, wheat, summer-fallow, hoed crop, barley, seeded down, hay, pasture).

Rotation "R," nine years' duration (summer-fallow, hoed crop, wheat, oats, summer-fallow, wheat, oats, seeded down, hay, pasture).

Rotations "J" "P," and "R" are all well suited to mixed-farming conditions.

Crop yields.—The yields of wheat varied between 16 bushels 16 pounds and 42 bushels 57 pounds per acre; oats, 47 bushels 23 pounds and 104 bushels 5 pounds per acre; barley, 22 bushels and 61 bushels 43 pounds per acre; and flax, 9 bushels 10 pounds and 12 bushels 29 pounds per acre. Fall rye yielded 30 bushels 20 pounds per acre and field peas 45 bushels 10 pounds per acre.

Cultural experiments.—The cultural investigational work consisted of experiments in the following: depth of ploughing, summer-fallow treatment, stubble treatment, seeding to grass and clover, breaking sod, applying barnyard manure, green manuring, seed-bed preparation, soil packers, depth of seeding, commercial fertilizers, underdrainage.

CEREALS.

The usual work with cereals was conducted on uniform test plots, sixteen sorts of spring wheat, fourteen of oats, sixteen of barley, eight of field peas, and three of flax being tested. In the five-year averages, Marquis heads the list of wheats, with an average yield of 60 bushels 54 pounds per acre; Danish Island was the highest yielding oat, with an average of 129 bushels 20 pounds; Canadian Thorpe, the highest yielding barley, 6 bushels 20 pounds; Mackay peas yielded, during the five years, an average of 49 bushels 38 pounds per acre; and Premost flax an average of 22 bushels 10 pounds per acre.

FORAGE PLANTS.

Indian corn.—Thirteen varieties of corn for ensilage were tested, and it has been found that the varieties most suitable to the Indian Head district are North-Western Dent, Early Longfellow, and Compton's Early. Free Press, Gehu, and Quebec Yellow are earlier but yield less forage. Eleven and a half acres sown to North-Western Dent corn gave an average yield of a little over 7 tons per acre.

Roots.—Twenty-two varieties of turnips, twelve of mangels, five of carrots, and three of sugar beets were grown, and in most cases gave a relatively higher yield than the previous season. An experiment to compare home-grown and commercial seed of mangels was also carried on.

Clovers and Grasses.—A series of experiments was inaugurated during the season to investigate the comparative values of the different hays and pasture grasses, the following, varieties being sown in duplicate plots of one-fortieth acre each: Brome grass, timothy, meadow fescue, tall oat grass, western rye grass, orchard grass, Kentucky blue grass, Canadian blue grass, and perennial rye grass. Three plots of western rye grass were sown for seed production, different methods of seeding being used. Nine plots of red clover were also sown for the same purpose. Experiments have shown that alfalfa is well adapted to climatic and soil conditions of southern Saskatchewan. The most suitable varieties are Grimm's and Baltic.

HORTICULTURE.

Fruits.—The fruit crop was well up to the average. Cross-bred apples gave a fair crop of fruit, and the small-fruit bushes were well loaded. The standard varieties of apples at present under test have not yet fruited, but have made a good growth and promise well.

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Vegetables—The work with vegetables consisted of variety tests and cultural experiments. The potato crop promised exceptionally well, but owing to the extremely wet weather during September and October it was found almost impossible to get the tubers lifted, and a large percentage was undoubtedly lost.

Ornamental Gardening.—Annual and perennial flowers were equal to those of any past season, while the beds of tulips were exceptionally fine, both in size and colour of flowers and the length of time the flowers remained in bloom.

Trees and ornamental shrubs made a strong growth during the season, but, owing to the wet fall, the new wood was not well ripened when winter set in.

BUILDINGS.

A new poultry administration building was erected during the year, with basement suitable for incubation purposes.

EXHIBITIONS.

Two exhibits were sent out from this Farm during the past season, one operating on the Canadian Pacific Railway main line between Moosomin and Regina, and the other on the Weyburn—Estevan line and towns in southern Saskatchewan. Twelve places were visited, namely, Rouleau, Milestone, Estevan, Alameda, Oxbow, Carnduff, Weyburn, Regina, Moosomin, Wapella, Whitewood, and Wolseley.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

THE SEASON.

The season of 1916 may be termed an average one as to weather conditions. The precipitation for the year ending March 31, 1917, was 15.48 inches, and the average precipitation for six years ending the same date was 14.74 inches. The hours of sunshine for the year ending March 31, 1917, was 3,076.7, and the average for six years ending the same date was 2,158.2. There was an average snowfall, and the rain during the summer was well distributed, and the growing crops, including both field and garden, were promising up to August 3.

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METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature F.			Total Precipitation.	Total Sunshine..
	Highest.	Lowest.	Mean.		
1916.	°	°	°	Ins.	Hrs.
April	72.3	— 2.6	36.7	0.69	194.3
May.....	79.4	18.1	46.4	2.49	193.3
June.....	74.6	29.5	55.7	2.15	246.0
July.....	87.2	43.4	64.8	3.66	293.5
August.....	82.5	30.4	58.5	2.45	284.1
September.....	77.2	22.2	49.6	0.68	183.1
October.....	64.8	9.6	36.2	0.81	116.2
November	50.0	— 5.3	23.8	0.20	108.5
December.....	37.1	—32.2	2.6	0.15	94.0
1917.					
January.....	34.5	—38.0	—9.25	0.95	75.0
February.....	34.2	—44.8	—6.93	0.9	140.3
March.....	36.3	—34.0	14.06	0.35	148.4
Total.....				15.48	2,076.7
Average for years 1911-12-13-14-15.....				14.59	2,174.5
Total for five growing months, April to August, 1916				11.44	1,211.2
Average for five growing months, 1911-12-13-14-15.....				9.666	1,280.56

THE HAIL-STORM.

The morning of August 3, 1916, was bright and hot, succeeding several days of very hot, dry weather. About noon heavy clouds began to appear in the west, and later these were rolling in different directions, some from the northwest and some from the southwest, and about 2 o'clock hail fell, driven by a strong northwest wind. The duration of the storm was just ten minutes. The width of the area affected was approximately six miles, and the general trend was ENE. So far as information can be gathered, the storm had its origin somewhere in Alberta, and swept a path all the way across the province of Saskatchewan to an indefinite region in northern Manitoba. Its path was not straight and was not single. It seems to have divided at different places. Nor was the direction of the wind the same in all places. At the Experimental Station the wind was from the northwest, and 2 miles south of the Station there was one large house with all windows broken on all sides, evidently indicating a whirlwind in the storm. This house stands about two miles north of the southern edge of the storm area. One hail stone measured 2 inches across, which was a fair average, and may be described as being the shape of a curling stone, i.e., rather flat than spherical.

At the Experimental Station, all grain crops were completely destroyed. Some of these crops were either driven completely into the ground or broken off and carried away by the wind, leaving only the rows of tops of the grain roots exposed. In other places the grain was broken off below the heads and the straw left in a tangled mass, while in other places there were all stages between these two extremes. Where the grain was completely cut off or driven into the ground there was no trouble experienced in going right on the land with a plough, but where it was left in a tangled mass it had to be raked, then mown and raked again to be either burned or hauled away. It could not be

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burned before being cut because of the immediate growth of green stuff underneath, which left the tangled mass too damp for burning.

The potato stalks were killed to the ground, and although the potatoes did not rot, both the yield and the quality were unsatisfactory.

The leaves of all root crops were broken off at the ground. The beets and mangels rotted at the crown in storage, the carrots and turnips developed new tops, but by the time frost came had not started to enlarge at the roots and at harvest time there was no more yield of turnips and carrots than there would have been at the time of the hail-storm.

Much damage was done to shrubs and trees. The northwest sides of the trees were bruised so that the bark was left open in spots to the wood, and sometimes these spots were so close together that the circulation on the exposed side of the trees was altogether stopped. In bad cases it presented a little of the appearance of sun-scald. In this district there are many bluffs of poplar trees, about 40 feet high, and any that were in the path of the storm presented a late-autumn appearance, being very much denuded of leaves.

The damage was not confined to vegetation. Numbers of blackbirds and meadow larks were found dead immediately after the storm, and the next day numbers of the same kinds of birds were hopping about with broken wings, and one dead rabbit, evidently killed by the storm, was found. There was a large number of poultry killed in the district, and wild ducks were found dead on the edges of the ponds. The horses that were in the fields became frantic, and there were two run-aways on the Experimental Station.

LIVE STOCK.

Horses.—The horses include fourteen head of work horses and two drivers. One mare died of colic in September, but all the others have been in good condition throughout the year.

Cattle.—The herd has increased to twelve head, including a Holstein bull sent from the Central Experimental Farm at Ottawa. The cows include two pure-bred Holsteins, one grade Holstein, and two grade Shorthorns. Besides the dairy cattle, seventy-three steers were purchased in October for feeding purposes. These were fed in four lots during the winter, to test the value of haled-out straw.

Sheep.—From the one hundred ewes and three rams purchased in November, 1915, there was a total of one hundred and seventy-five in the fall of 1916. Out of these, thirty-three wether lambs and twenty-seven old ewes were killed and dressed, leaving a larger and better flock than at the beginning. The sale of the wool through the Co-operative Organization Branch of the Saskatchewan Department of Agriculture was very satisfactory.

FIELD HUSBANDRY.

Besides the regular experimental work, a great deal was done in further bringing into proper condition the land purchased two years previously. The great task is checking the wild oats, and attempting to eradicate them. The quarter section that had been summer-fallowed in 1915 was sown to oats and barley and showed a much-diminished growth of wild oats; the quarter section that was cropped since fallowing was twice ploughed shallow in the spring and sown late to oats, and the third quarter was fallowed. After the hail-storm a tractor was purchased and about one hundred acres ploughed with it.

CEREALS.

There were under test in 1916, seventeen varieties of wheat, twenty of barley, twelve of oats, and thirteen of peas. These were all doing well until destroyed by the hailstorm on August 3. One plot of Marquis wheat sown on November 6, 1915, was doing particularly well.

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FORAGE PLANTS.

All forage crops were promising a good yield in 1916 till the time of the hail-storm on August 3. Some of the hay had been harvested, but the remainder was all destroyed. All root crops were so injured that the yields were unreliable for comparison, and the corn was ruined. Millet was tried for the first time, and was not promising.

HORTICULTURE.

Fruits.—The plums continued to make good growth, but many of the apples trees suffered severely from winter-killing. A few quarts of apples were obtained from some of the trees.

The strawberries and raspberries suffered somewhat from winter-killing, but the currants proved hardy. Some gooseberries bore for the first time since the Station was established.

Vegetables.—The whole vegetable garden was very promising till it was destroyed by hail. The tomatoes especially were a very promising crop.

The results in potatoes were quite different from what they were in previous years, which may be accounted for by the stalks being destroyed by the hail before the potatoes were mature.

Ornamental gardening.—The flower border, and especially the perennial border, is becoming better every year. The display begins with tulips early in May and ends with asters in the autumn. The shrubs planted along the driveway are becoming well enough developed to show the advantage of their massed effect.

BUILDINGS.

When three quarter-sections of land were added to the Experimental Station the buildings were not adequate to the necessary extra live stock and equipment, and during 1916 some additions were made. The barn, which had been arranged to accommodate eight horses and five cattle and allow a driveway and room for several rigs, was rearranged to hold nineteen horses in stalls and two in a box stall.

The old stable that was on the farm at the time of its purchase in 1908 was temporarily arranged to accommodate ten cattle, and equipped with adequate ventilation.

A new implement shed, 24 feet by 80 feet, 7 feet at the back and 10 feet at the front, was built which, together with the former building, 20 feet by 80 feet, affords sufficient accommodation for the implements and machines.

A sheep barn, 20 feet by 68 feet, with 12-foot posts was built. This is large enough to accommodate about a hundred sheep.

EXHIBITIONS.

A large exhibit displaying various phases of the work of the Experimental Station was assembled and shown at thirteen fairs.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

SEASONAL NOTES.

The season of 1916 was wet and cool. The precipitation of 16.88 inches for the six growing months is much above the average. Cold weather continued up to May 6. Seeding only commenced on April 20, almost a week later than usual, but while crops of all kinds were late starting, they made good progress during the early summer. Hail-storms were more prevalent than usual, and did much damage in some districts. A frost on August 11, followed a few days later by three days of wet weather, did serious damage to the wheat crops, in many districts. Cool, wet weather during the late summer delayed harvest operations, and a number of fields were injured by a frost on September 14; threshing operations were also much delayed, and a considerable percentage of the grain crops was not threshed until November. The ground froze too hard for cultivation on November 4.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature F.		Precipitation.			Total Sunshine. Hours.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
	°	°	Inches.	Inches.	Inches.	
1916.						
April.....	74.2	9.1	0.25	0.27	0.52	178.8
May.....	77.8	17.8	2.54		2.54	200.7
June.....	78.0	32.3	4.25		4.25	254.5
July.....	87.0	38.0	4.04		4.04	286.8
August.....	83.0	30.2	3.87		3.87	254.0
September.....	78.0	20.4	1.66		1.66	138.7
October.....	49.0	23.7	0.10	0.40	0.50	123.9
November.....	63.8	- 2.2		0.05	0.05	116.6
December.....	47.2	-31.8		2.5	2.5	104.0
1917.						
January.....	43.2	-41.0		0.60	0.60	78.3
February.....	40.0	-48.8		0.15	0.15	127.4
March.....	37.8	-31.2		0.03	0.03	194.3
Total for the year.....			16.71	4.00	20.71	2,058.0

LIVE STOCK.

Horses.—There are now seventeen horses on the Scott Station, two colts having been foaled in 1916. Records are kept of the time horses were at work, and the cost of food, etc., for the year. Experiments on wintering idle horses, cost of raising horses, and feeding methods, were continued.

Cattle.—One grade Shorthorn cow and calf are kept at this Station for the purpose of supplying the employees with milk. Two carloads of steers were purchased in the fall for feeding experiments. One lot is being fed in a frame shed, the other lot in a high-board corral.

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The herd of cattalo continued in good condition throughout the summer. Late in December they were shipped to the Buffalo park, Wainwright. No increase in the herd took place during the year.

Sheep.—The lamb crop was lower than usual, and severe losses were also sustained from the depredations of dogs. A good crop of wool was secured, the average weight per fleece amounting to $8\frac{1}{2}$ pounds.

Swine.—Six Berkshire sows and a Berkshire boar were kept at the Station, and were housed in two portable hog cabins. The average cost of feed per sow for the six months ending March 31, 1917, was \$5.98.

FIELD HUSBANDRY.

Rotations.—An investigation into the best kinds and arrangements of crops for rotations suitable to northwestern Saskatchewan continues as one of the most important lines of work at this Station. The following rotations are being tested:—

Rotation "A," wheat continuously: An anthracnose disease appearing in the field taken up by this rotation made the yield unusually low.

Rotation "C," three years' duration (summer-fallow, wheat, wheat).

Rotation "J," six years' duration (summer-fallow, wheat, wheat, oats seeded down, hay, pasture): This rotation has, since its inauguration, produced uniformly substantial revenues, the average profits for the past five years being \$8.18 per acre. It is planned to try this rotation on a more extensive scale, using six 20-acre fields.

Rotation "P," eight years' duration (summer-fallow, wheat, wheat, summer-fallow, peas, barley, hay, pasture): This rotation is intended for a farm where diversified farming is carried on.

Rotation "R," nine years' duration (summer-fallow, peas, wheat, oats, summer-fallow, wheat, oats, hay, pasture): The profit per acre from this rotation in 1916 was \$13.04.

Crop Yields.—Marquis wheat, on breaking, gave a yield of 41 bushels 51 pounds per acre; and Victory oats, on breaking, 113 bushels 7 pounds per acre. O.A.C. No. 21 barley yielded 55 bushels per acre; and Arthur peas, on summer-fallow, 36 bushels 13 pounds per acre. The yield of early potatoes averaged 202 bushels 20 pounds per acre. The yields of hay and field corn were fairly good.

Cultural Experiments.—Experiments in cultural work included the following: Rates of seeding wheat and oats; dates of seeding wheat, oats, barley, and flax; prairie breaking; summer-fallow and stubble treatment; seeding down to grass and clovers; use of barnyard manure; green manuring; depth of seeding; seed-bed preparation.

CEREALS.

The system of making duplicate tests of all varieties of grain was followed. A uniform stand of all kinds of grain was secured. The flax crop was injured by the August frost, while late-maturing varieties of wheat, including Red Fife, were caught by the frost on September 14.

On the seed plots, good crops were secured. A 30-acre field of Marquis yielded 41 bushels 50 pounds per acre. Victory and Banner oats yielded 113 bushels and 111 bushels per acre, respectively. In addition, Ligowo oats, O.A.C. No. 21, Manchurian and Black Japan barleys, and Arthur peas were grown to supply seed for the Station and to sell to farmers in limited quantities. In all, seventy farmers were supplied, and a total of 1,600 bushels sold for seed purposes.

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FORAGE CROPS.

Indian Corn.—Variety tests with Indian corn were again conducted. Eleven varieties were tested, the yields ranging from 2 tons 1,633 pounds to 7 tons 1,293 pounds, per acre, Salzer's North Dakota being the heaviest yielder.

Roots.—Of the root crops, turnips gave yields varying from 17 tons 1,975 pounds to 39 tons 550 pounds per acre, twenty-five varieties being tested; the yields of the thirteen varieties of mangels were from 230 bushels to 580 bushels per acre; three varieties of sugar beets yielded, on the average, 177 bushels per acre; and five varieties of carrots ranged in yield from 106 bushels to 253 bushels per acre.

Grasses and Clovers.—Variety and soil cultural tests were carried out with alfalfa, Grimm's proving the best yielder. Variety tests were also carried out with grasses and clovers. Good crops of hay were secured from old hay fields, but the crop from the 1915 seeding was light.

HORTICULTURE.

Owing to the severe winter, loss of shade trees, apple trees and perennial flowers was very heavy. Some 13 degrees of frost was recorded on September 14. Cuttings made from the willows and poplars in November showed frost damage. Many of the more tender kinds failed to grow. Warm weather for two weeks in February, followed by a cold March, may have aggravated the injuries received in the fall. The spring of 1916 was late, and no doubt many of the trees would have survived had the spring been favourable.

From an experimental standpoint, the losses sustained are well worthy of consideration, since hardy varieties came through with little damage, and the more tender kinds were in many instances killed out.

Small Fruits.—The hardy kinds of fruit bushes made a splendid showing during the past season; the cultural experiments with the different kinds of fruits have been continued, and a good crop of black currants, gooseberries, and raspberries was secured, while the yields from the red and white currants and strawberries were not so satisfactory.

Ornamental Gardening.—In the flower garden, flowering bulbs and annual flowers made a splendid showing. Paeonies and iris are two of the hardiest kinds of perennials under test.

FARM IMPROVEMENTS.

Buildings.—A sheep shed, 24 by 67 feet, was built. This building is one story, frame, with a shingle roof; the walls were sheathed with rough lumber, using battens to cover the joints. Ample light was provided for. The importance of dryness, plenty of light, and sufficient ventilation for sheep cannot be overestimated.

Fencing.—Over half a mile of woven wire fencing was erected. The dam in the ravine in the pasture was built higher. Later in the autumn approximately half a mile of roadway was graded up.

EXHIBITIONS.

An exhibit from the Station was displayed at Saskatoon, Plenty, Kerrobert, Kindersley, and Alsask.

MEETINGS.

Changes in the staff on the Station have prevented as much extension work as was done in previous years. During the season, however, the Acting Superintendent

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addressed several meetings held by farmers' organizations. He placed the awards at a school fair held at Cut Knife, and assisted in judging the horticultural exhibit at the Wilkie fair. During the harvest season he inspected numerous fields of wheat in the surrounding district to determine the extent of injury from the frost and wet.

EXCURSIONS.

During the midsummer months the following farmers' organizations held picnics at the Station: Scott Farmers' Club, East Prospect Grain Growers' Association, Wilkie Agricultural Society. In addition, the Narrow Lake Homemaker's Club and two Sunday Schools were entertained. A total of 1,000 persons attended these gatherings.

VISITORS.

It has been estimated that 2,636 persons visited the Station during the year 1916-17.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

THE SEASON.

The precipitation during the growing season was unusually heavy for southern Alberta. All cereals, roots, and other grains did better than the average; especially was this true of the wheat crop. Coming, as it has, right after 1915, which was in itself a marvellous growing year, 1916 has enabled this part of the country to set a high-water mark for two consecutive seasons' production which, to say the least, have been remarkable.

The months of January and February of 1916 will long be remembered for the severe cold spell which lasted from the 8th of January to the 12th of February, with scarcely a day when the temperature rose above zero. For the month of January the average mean temperature was 9 degrees below zero. Just before the cold spell set in there was a fall of snow all over the country, and this remained without drifting until the "Chinook" came. Then a week's very mild weather melted the snow without taking it all off into the air, and the whole prairie was covered with sloughs and ponds.

Work on the land was commenced as early as March 10 on a few farms in the district, and became quite general by the last of March. The first surface cultivation of the land done on the Station was on March 21, and it was on this date that the first seeding was done.

Heavy winds during April and May caused soil drifting, and the spring was backward and cold right through May, with no rainfall till the 22nd. Up to that time, while most of the crops were up above the ground, they had made little noticeable growth. After May 22, rains of three and four days' duration were quite frequent. The total precipitation for April, May, and June was 7.77-inches. During July and August, seasonably warm weather hastened the crops along to maturity. The last frost in the spring was on May 18, when 31.6 degrees was recorded. The first frost in the fall was September 14, 31.2 degrees being recorded.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature F.			Precipitation.	Sunshine.
	Mean.	Maximum	Minimum.		
	°	°	°	Inches.	Hours.
1916.					
April.....	44.35	78.1	18.5	0.46	230.3
May.....	46.95	77.2	22.0	3.77	230.2
June.....	56.1	63.2	32.6	3.54	225.9
July.....	63.6	89.0	40.0	3.33	291.4
August.....	60.0	84.0	35.2	2.97	333.8
September.....	52.77	78.1	24.0	4.66	161.4
October.....	39.39	75.0	18.0	1.99	180.2
November.....	32.25	63.0	-17.5	0.49	140.8
December.....	12.0	50.0	36.0	0.51	96.1
1917.					
January.....	13.1	48.5	-41.8	0.73	80.9
February.....	11.1	53.5	-41.5	0.27	96.7
March.....	26.3	59.0	17.0	0.10	153.5
				22.82	2,221.2

LIVE STOCK.

Cattle.—Twenty-seven 2-year-old steers were purchased locally, divided into three lots, and fed in the open. The two main objects were to compare alfalfa hay as a roughage with a mixture consisting of three-fourths alfalfa and one-fourth green feed, and to compare the profits derived from long and short feeding. The meal ration of the first lot, which, like the second lot, was fed alfalfa hay and green feed as a roughage, was increased more rapidly than the other two lots, the feeding period being 95 days, while for lots 2 and 3, the feeding period was 154 days. The short-feed steers made a net profit per head of \$22.71, sold at \$9.68 per 100 pounds and cost 19 cents to produce 1 pound gain, while the long-feed steers on the same rations made a net profit of \$26.63 per head, sold at \$10.70 per 100 pounds, and cost only 16 cents to produce 1 pound gain. The two lots fed the same length of time on different roughages confirmed the previous findings, that alfalfa hay and green feed gave slightly higher gains and more satisfactory returns than alfalfa hay alone.

Sheep.—Two cars of range lambs were purchased in October, 1915. Half of them were fed until March, and then disposed of at \$9.72 per hundredweight. The remainder were kept for shearing, and sold in May at \$9.75 per hundredweight, \$411.92 being received for the wool, the average weight of each fleece being 5.6 pounds. The net profit on the short-feed lambs was \$1.76 per head, while for those sold in May the net profit was \$3.12 per head.

A flock of one hundred range ewes was purchased in November, with a view to grading up by using pure-bred Shropshire sires, and also to ascertain whether it is possible to maintain grade sheep on pastures of cultivated grasses.

POULTRY.

The flock at Lethbridge is composed of the Barred Rock and White Leghorn breeds, the former appearing to be the more suitable breed for Lethbridge conditions. There were 472 chickens raised to maturity in 1916. Most of them were raised in the Candee coal-stove brooder. In a laying test between 45 Barred Rock pullets and an

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equal number of hens of the same breed, all being fed alike, the pullets laid 589 eggs in three months, and the hens only 85. The pullets are all trap-nested, and those making the poorest returns disposed of, the better ones being retained for breeding purposes.

BEES.

The results from the apiary in 1916, were not quite so satisfactory as the previous summer. Three hives that were wintered in the cellar came through in much better condition than the two wintered in cases outside. One more colony was made by division, and swarming was prevented by cutting away all queen cells formed. The total amount of honey extracted was 172 pounds, and was sold at 17 cents per pound.

FIELD HUSBANDRY.

Rotations.—In connection with the work with rotations, there have been no striking results obtained during the past season. The following rotations are under test:—

Rotation "A": Wheat continuously.

Rotation "B": Two years' duration (wheat, summer-fallow).

Rotation "C": Three years' duration (summer-fallow, wheat, wheat or coarse grain).

Rotation "M": Six years' duration (summer-fallow; wheat; coarse grain, manured in fall; summer-fallow; peas and oats for hay; barley or oats).

Rotation "S": Nine years' duration (summer-fallow; hoed crop; wheat; summer-fallow; wheat; coarse grain; summer-fallow, manured; peas and oats for hay; rye pasture).

Rotation "T": Ten years' duration (summer-fallow; wheat; oats or barley; seeded to alfalfa; alfalfa hay or seed; alfalfa hay or seed; alfalfa hay or seed; summer-fallow; hoed crop; wheat, manured in fall).

The following rotations are irrigated:—

Rotation "U": Ten years' duration (seeding alfalfa; alfalfa for five years; hoed crop; wheat; oats; barley).

Rotation "V": Alfalfa continuously.

Rotation "X": Fifteen years' duration (seeding alfalfa; alfalfa for nine years; barley; corn; wheat; oats; peas).

Crop yields.—The yields of field crops in all cases were particularly high, with the exception of alfalfa hay on the irrigated land, which was distinctly lower than normal, owing, no doubt, to the fact that the large number of cloudy, rainy days interfered with its rapid growth, for on irrigated land, where the moisture is supplied artificially, alfalfa produces the greatest tonnage in seasons which have the greatest number of sunshiny, hot days.

Cultural experiments.—The following is a brief summary of the results obtained from the cultural experiments carried on during the five years just past:—

In the "summer-fallow treatment" 8-inch ploughing in June gave better results than shallower ploughing. The average yields of wheat for five years from 4-inch, 6-inch, and 8-inch ploughing are, respectively, 31.9 bushels, 34.2 bushels, and 36.8 bushels. When a crop of rape was raised on the land and pastured off, in lieu of summer-fallow, the yield was reduced approximately 10 bushels per acre. Of the plots ploughed for fallow May 15, June 15, and July 15, the one ploughed June 15 gave the highest average yield, and July 15 the lowest. In the "applying manure" experiment, applying manure after the crop is sown in the spring has given good results with wheat, oats, and barley. In the "green manure" experiment there is no apparent advantage in ploughing under a green crop. It has reduced the yield in every case. In the

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"seed-bed preparation" experiment, the better the preparation given the greater the crop obtained. In the "packing experiment," the subsurface packer gave better results than either the surface or combination packer. In the "depth of seeding" experiment, where the seed is sown 1, 2, 3, and 4 inches deep, that sown 2 inches and 3 inches deep gave better returns than the plots put in either 1 or 4 inches deep. Spring ploughing, on the average, gave better results than fall ploughing.

The results of a five-year experiment in which wheat, oats, barley, and flax were sown at ten days' to two weeks' interval would indicate that, at Lethbridge, the latest date at which it is possible to sow these grains on fallow, with a reasonable assurance that they will ripen before frost, is as follows: Wheat, May 12; oats, May 24; and flax, about May 24 or 25; barley, June 1.

CEREALS.

Excellent crops of all the cereals were obtained. The yields, although not quite so heavy as in 1915, were nevertheless, very much better than normal. Of sixteen varieties of spring wheat tested, Huron yielded 77 bushels 15 pounds per acre, the average yield for the past four years of this variety on irrigated land having been 64 bushels 24 pounds per acre. Danish Island oats yielded 159 bushels 24 pounds per acre, and Invincible barley 99 bushels 3 pounds per acre. Chancellor peas gave 57 bushels per acre; and Montana flax, 20 bushels 20 pounds per acre. Silver Hull buckwheat gave 45 bushels 30 pounds per acre, and spring rye 52 bushels 43 pound per acre.

FORAGE PLANTS.

Indian Corn.—Thirteen varieties of Indian corn gave an average yield of 9 tons 835 pounds per acre; the highest, Salzer's North Dakota, yielding 14 tons per acre.

Roots.—The turnips on the non-irrigated area gave an average crop of 34 tons 1,178 pounds per acre, and on the irrigated area, 25 tons per acre. Eleven varieties of turnips were under test. The irrigated area sown to mangels gave a crop of 19 tons 1,904 pounds per acre, and the non-irrigated area 19 tons 1,965 pounds per acre. Experiments showed that medium-sized mangel seed gave larger returns than either small or large seed. An experiment comparing home-grown and commercial mangel seed was not conclusive. On the irrigated area, five varieties of carrots gave an average yield of 18 tons 1,770 pounds per acre, while on the non-irrigated area only 1 ton 1,630 pounds per acre was obtained. Four varieties of sugar beets were also tested.

Grasses and clovers.—Alfalfa, which is the main hay crop on the irrigated lands in the Lethbridge district, did not yield as well as usual. Winter-killing was observed to a limited extent. The quality of hay obtained was better than in 1915.

HORTICULTURE.

Fruits.—Practically all apple trees old enough to produce, except the crab-apples, winter-killed. Plum trees stood the winter well and bloomed freely, but an untimely frost allowed little fruit to set. Currants, raspberries, and strawberries did not produce as well as usual, and the berries were smaller.

Vegetables.—The usual variety tests with vegetables were continued, and various cultural experiments were also carried on. On the non-irrigated area, Gold Coin potatoes gave a yield of 570 bushels per acre, 530 bushels of which were marketable. In the four-year averages this variety also heads the list.

Ornamental Gardening.—Many varieties of annuals, herbaceous perennials, and bulbs were grown. A number of trees and flowering shrubs were seriously affected by the severe winter.

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NO IRRIGATION NECESSARY.

Again in 1916 as in the season previous, the generous rains that came during the time the crops were growing made irrigation unnecessary for general field crops on the irrigated part of the farm. It is remarkable to have two seasons in succession with the rainfall such that the application of water to the growing crop would not increase the yield. In the last fifteen years there have been only three seasons, 1902, 1915, and 1916, when such has been the case in the Lethbridge district. During the season just past, however, the crops on the hay and grass lands were greatly improved in yield by irrigation in early May.

EXHIBITIONS.

The Lethbridge Experimental Station again sent an exhibit to the following thirteen fairs in southern Alberta: Calgary, High River, Nanton, Claresholm, Stanley, Vulcan, Carmangay, Macleod, Gleichen, Raymond, Cardston, Taber, and Grassy Lake.

EXCURSIONS AND VISITORS.

Three excursions or farmers' picnics were held in July. Arrangements were made with the Canadian Pacific to run special trains to and from the Station on July 18 from Medicine Hat, on the 19th from High River, and on the 20th from Calgary via Alderside. On the first day rain started early in the morning, but on the other two days the weather was fair. In all there were 800 fares collected on the trains. During the year there has been a large number of people visit the Station; over 2,610 have been counted, although there were doubtless many more than this.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

THE SEASON.

The spring of 1916 was favourable for an early commencement of work on the land, the first seeding of wheat being done on April 10, and practically all seeding being concluded before the first of May. The temperatures during the growing season were below normal, and this fact, together with an unusually heavy precipitation, delayed the maturity of crops considerably beyond the average date for the commencement of harvest, and also interfered with the harvest operations. A frost on August 10 did damage on certain areas. It seemed to pass over the country in well-defined waves, and those districts which were in the trough of these frost waves, suffered to quite an extent. Fortunately most districts contained areas which escaped, and from these, seed for the coming year has been obtainable. Even where frosted, the grain has been used to excellent advantage for feeding stock, and has been marketed through that channel at a price above the average for No. 1 grades. Because of the difficulty experienced in harvesting crops, little fall ploughing was done. The winter of 1916-17 has been cold and windy, with the result that heavy demands have been made by all classes of live stock on the feed supply. Indications are that work on the land in the spring of 1917 will begin much later than usual.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Max.	Date.	Min.	Date.	Precipitation.	Sunshine.
	°		°		Ins.	Hours.
1916.						
April.....	71.8	26	17.9	22	0.600	201.1
May.....	71.8	2	19.9	9	2.043	179.3
June.....	77.9	17	28.8	3	3.570	198.1
July.....	82.8	16	36.1	5	4.311	229.5
August.....	82.8	13	28.9	11	5.218	253.0
September.....	76.8	17	23.4	28	3.055	176.0
October.....	71.7	15	16.9	28	1.013	138.6
November.....	56.3	2	-18.1	12	0.400	122.0
December.....	44.0	2	-40.2	27	0.400	94.3
1917.						
January.....	42.8	8	-49.8	31	0.75	73.8
February.....	42.3	14	-45.7	1	0.52	119.1
March.....	48.3	4	-14.9	3	0.33	184.1
					22.21	1,968.9

LIVE STOCK.

Horses.—The horses at the Lacombe Station number twenty-six, and include five pure-bred Clydesdales and two pure-bred Percheron mares. The cost of carrying three colts, rising 2 years old, for one year, amounted to \$53.06 each, the colts making average gains of 433.3 pounds each during the year. All the horses not required for work were turned out in the fall, and fed straw during the winter. All the horses lost weight, but since straw only was fed, the cost of feed for the winter amounted to only 4 cents a day.

Dairy Cattle.—There are now twenty-three pure-bred Holstein cattle in the dairy herd. The milk flow has been maintained up to a profitable point, and the health of the cattle improved by the use of a succulent ration of ensilage made from peas and oats. During the winter months all the milk was manufactured into Cheddar cheese, the average returns per cow being \$167.12.

Beef Cattle.—The herd of Aberdeen Angus cattle comprises twenty-nine head. An experiment to discover the cost of gains made by young cattle on pasture showed that in eight months these cattle made average gains of 256 pounds each at a cost per pound gain of 3.39 cents.

Twenty-two steers, rising 2 years old, were run on a fenced section from May 24 to October 19, and made an average gain of 318 pounds per head. Two car-loads of 2-year-old steers were fed during the winter. Both received similar rations as regards bulky fodder, but one lot was fed a ration of frosted wheat, while the other was fed a grain ration consisting of equal parts of oats and barley. The group fed on frosted wheat made a net profit per head of \$3.38 more than the group fed oats and barley, thus seeming to show the superiority of the former feed as a grain ration over the latter.

Sheep.—In 1916 seventeen lambs were raised from sixteen common grade ewes, the flock now numbering forty-five. The ewes from the first cross of Shropshire blood on range stock in the grading-up experiment are being bred for the first time in 1917. The first cross weighed, when eighteen months old, an average of 6 pounds each more

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than their dams, and when fully matured will probably show an increase of from 15 to 20 per cent.

The wool yield appears to be improved in that it carried a reduced grease content and increased length of staple. The wool sales for the year amounted to \$107.63.

Swine.—An experiment to determine the relative value of barley, wheat, sweet clover, rape, and alfalfa for hog pastures was carried on during the year. The alfalfa and rape produced the most economical gains, and carried 1,518.9 pounds and 1,786.1 pounds of hogs per acre, respectively. Since there has been considerable inquiry as to the value of whey for hogs, an experiment was carried on for the purpose of securing information covering this point. It was shown that 100 pounds of sweet whey fed to hogs ranging in weight from 50 to 150 pounds, effected a saving of 19.146 pounds of grain.

Hogs on the self feeder versus a group fed a 3 per cent grain ration showed much more rapid gains, though this year gains were made at greater grain cost. The hogs on the self feeder showed tremendous time saving, amounting to 51 days in a 92-day test. Self-fed frosted wheat, valued at \$1 per bushel, produced pork during the winter months at a cost of 7.62 cents per pound, while oats valued at 43 cents and barley at 80 cents per bushel, and fed in equal parts through a self feeder, cost 8.9 cents for 1 pound of pork. The cost of wintering sows has been shown to be \$20.90, and the cost of pigs at weaning time, estimating six pigs to the litter, figures out at \$3.48 for aged sows and \$2.99 for gilts with first litters.

POULTRY.

The stock of poultry at Lacombe consists of 70 hens, 126 pullets, 36 cockerels, 4 cocks, and 8 capons of the Barred Plymouth Rock, White Wyandotte, and S.C. Rhode Island Red breeds, 9 geese, 1 duck, and 4 turkeys. The number of eggs set was 3,257, and from these 1,612 chicks were hatched in a Candee incubator. Satisfactory yields of eggs were secured during the winter, the cost to produce being 17.2 cents per dozen. Trap-nesting showed that a pen of White Wyandotte pullets gave an egg yield of 60.2 per cent during the four winter months. During the year losses were experienced among the ducks, due to foxes, and among the turkeys from blackhead.

BEES.

Of the four colonies put away in November, three were alive and strong when removed from the cellar in April, the three living colonies having consumed an average of 23 pounds of honey during the winter. Two queen bees were imported, and nuclei made to receive them. The honey yield amounted to 70 pounds and sold at 20 cents a pound, the total profit on the apiary for the year being \$10.45. Six colonies were removed to their winter quarters on November 4.

FIELD HUSBANDRY.

Rotations.—The profits from the rotations were lower than usual this year, owing to the frost which reduced the yields.

Rotation "C," three years' duration (wheat, wheat, summer-fallow): The results from this rotation show the folly of depending on one crop, especially in this section of Alberta.

Rotation "L," six years' duration (hay, pasture, pasture, wheat, oats, barley seeded down).

Rotation "K," six years' duration (hoed crop; peas or mixed grain, wheat, oats or barley, seeded down; hay, manured in autumn; pasture; pasture): This mixed-

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farming rotation is similar to "L," except that a crop of roots is grown in place of one grain crop.

Rotation "O," seven years' duration (hoed crops, or peas and oats; wheat; oats; summer-fallow; barley, seeded down; hay, manured in fall; pasture).

The main farm rotation is of six years' duration, the rotation years being hay, pasture, pasture, oats, barley seeded down to grass. This rotation is carried on on an area of 215.6 acres.

Cultural Experiments.—The following experiments in cultural investigation work were carried on: Depth of ploughing, summer-fallow treatment, seeding to grass and clover, breaking sod, application of barnyard manure, green manuring, depth of seeding.

The results secured from a number of these experiments were rendered of no value, due to the frost of August 10. In spite of the loss of information along some lines, however, the advisability of deep ploughing, the uselessness of double ploughing of summer-fallows in this section, and the advisability of breaking sod early in the season, were again demonstrated.

CEREALS.

Seventeen varieties of spring wheat were sown in duplicate plots at the rate of 3 bushels per acre, Huron producing the highest yield, 57 bushels per acre. One plot of spring rye gave a crop of 49 bushels 6 pounds per acre, the threshed grain weighing 56 pounds to the measured bushel. Of the fourteen varieties of oats grown, Gold Rain gave the highest yield, 131 bushels 6 pounds per acre; and of the ten barleys, Gold, although taking longer to mature than some of the lower-yielding varieties, gave 70 bushels 20 pounds per acre. Arthur proved the earliest-maturing variety of peas tested, and yielded 28 bushels 50 pounds per acre. No flaxseed matured, as it was caught by the frost of August 10.

FORAGE PLANTS.

Indian Corn.—Twelve varieties of corn were planted, but the crop failed to produce a yield of commercial value.

Roots.—Twenty-four varieties of turnips were tested, the yields ranging from 12 tons 150 pounds to 25 tons 950 pounds per acre. Of the fourteen varieties of mangels, Giant Yellow Globe, the highest yielder, produced 9 tons 550 pounds per acre. In an experiment to compare home-grown and commercial mangel seed, only the seed secured from Agassiz grew. Five varieties of carrots were sown, Giant White Vosges giving a yield of 10 tons 1,650 pounds per acre. A test of sugar-beet seed obtained from different sources was also carried on.

Grasses and Clovers.—In a comparison made between seeding alfalfa broadcast and in drills, it was found the average yield for three years of the alfalfa sown broadcast was 4,547 pounds per acre, while for that sown in drills the yield was only 3,718 pounds per acre.

Thirty-four plots of one-fortieth acre each, were sown to the following varieties of grasses and clovers: red clover, alsike, alfalfa, timothy, awnless blue grass, Kentucky blue grass, meadow fescue, red top, orchard grass, and western rye grass. An acre of unploughed prairie sod was seeded to Kentucky blue grass, and a successful stand secured.

HORTICULTURE.

Fruits.—For the fourth year in succession, a crop of crab-apples was secured. Many of the standard apple seedlings were winter-killed. The currant plantation has not yet reached its maximum productiveness, and consequently the yields were

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light. Gooseberries gave a light crop, Herbert again proved the best variety of raspberries, and strawberries gave a satisfactory yield.

Vegetables.—The usual variety tests with vegetables were again carried on and cultural tests with beets, cabbage, carrots, onions, parsnips and peas were continued. A test of home-grown and commercial peas showed that the home-grown stock can be relied upon to produce results equal to those from commercial seed. Variety tests and cultural experiments were also carried on with potatoes. It was found that to produce 1 acre of potatoes, yielding 233 bushels 45 pounds, the cost was \$42.35.

Ornamental Gardening.—Variety tests were carried out with annuals, herbaceous perennials, and bulbs. The severe winter of 1915-16 caused great loss among the trees and shrubs.

BUILDINGS.

A new wood-and-coal shed 12 feet by 16 feet, with accommodation for the bone cutter and engine, was erected in the poultry plant. No floor was put in except for the coal bin and a closet. The entire cost of this building, including painting, was \$114.23.

EXHIBITIONS.

An educational exhibit was shown by this Station at the following points: Calgary, Provost, Edmonton, Vegreville, Red Deer, Camrose, Three Hills, Wetaskiwin, Swallow, Didsbury, Rocky Mountain House, Innisfail, Sedgewick, Olds.

It is estimated that 18,640 persons were interested directly or indirectly in the work of the farm through this agency.

MEETINGS.

Addresses by the superintendent were delivered at the following places: Calgary, Vermilion, Brandon, Toronto, Ponoka, Penhold, Edmonton, Red Deer.

He acted as judge of sheep and swine at the Red Deer exhibition, and of swine at the Calgary Industrial Exhibition. Mr. B. C. Milne, assistant to the superintendent, addressed meetings at Craigmyle and Calgary.

EXCURSIONS.

A successful excursion was run to the farm on July 21. Special trains from Calgary, Edmonton, and Coronation brought over 1,200 persons. Addresses were delivered by: Dr. J. G. Rutherford, Chief of Agriculture and Animal Industry, C.P.R., Calgary; Alex. Galbraith, Superintendent of Fairs and Institutes, Edmonton; and H. W. Wood, President of the United Farmers of Alberta. Including the excursion day visitors, about 2,290 people visited the farm during the year.

EXPERIMENTAL STATION, SUMMERLAND, B.C.
REPORT OF THE SUPERINTENDENT, R. H. HELMER.

THE SEASON.

The spring of 1916 was very backward, the cold weather lasting right into early summer; and although the days were warm the nights were cold. Very little rain fell during the growing season. It has been a very unsatisfactory year for dry-farming, and the land was too dry to fall plough. Crops were very late maturing, especially vegetables, and low prices prevailed in consequence.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Temperature.		Rainfall.	Snowfall.
	Highest.	Lowest.		
			Inches.	Inches.
1916.				
April.....	72.5	30.0	0.59	
May.....	82.0	31.0	0.415	
June.....	95.0	39.0	1.555	
July.....	87.0	45.0	1.785	
August.....	93.0	43.0	0.16	
September.....	87.0	38.0	0.655	
October.....	69.0	28.0	0.14	
November.....	53.0	11.0	0.51	0.50
December.....	45.0	2.0	0.08	10.00
1917.				
January.....	47.0	-10.0	0.14	2.00
February.....	43.0	- 2.0	0.03	5.50
March.....	48.0	9.0	0.15	2.40
Total.....			6.210	20.4

LIVE STOCK.

Horses.—Seven horses are kept at the Station, two of them being 7-year-old Clydesdale mares. The rations which have been fed are as follows: Oats and bran, 5 parts to 1, 15 to 18 pounds per day; chopped hay, 10 to 12 pounds per day. All the horses are in good condition.

Cattle.—Forty-one head of steers are under feeding tests at the close of the year on rations consisting of varying quantities of hay and straw, oat chop, cracked corn, and oil-cake meal.

BEEES.

Two colonies of Italians were purchased locally and a start made with bees at Summerland in the spring of 1916. A swarm was cast by each hive, but as both were weak they were united. The total honey crop amounted to 70 pounds, and was sold at 15 cents a pound. The three hives were wintered in outdoor wintering cases.

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FIELD HUSBANDRY.

All the land cleared during the winter of 1915 was well worked up with a spring-tooth cultivator, and harrowed well for seeding to oats and alfalfa. This land is very sandy, and both crops did well, considering the character of the soil. All the fall ploughing was disced and harrowed as soon as possible, to conserve moisture.

Crop Yields.—Oats gave good yields, one field of Banner producing 75 bushels per acre, the best sample weighing 42 pounds to the measured bushel. Corn grew well, and all varieties ripened before frost came. Clover and alfalfa were disced and harrowed early in the spring and re-marked for irrigation. All land newly seeded to hay made satisfactory growth.

CEREALS.

Five varieties of wheat were tested, the yields ranging from 10 bushels 37 pounds to 22 bushels 30 pounds per acre. The oat yields were from 31 bushels to 41 bushels 6 pounds per acre, and the barley from 25 bushels 25 pounds to 29 bushels 20 pounds per acre. On the dry farm, Kharkov wheat yielded 5 bushels 39 pounds per acre, Shirka wheat, 3 bushels 48 pounds per acre; fall rye, 6 bushels 6 pounds per acre; and spring oats, 13 bushels 26 pounds per acre.

FORAGE PLANTS.

Indian Corn.—All varieties of corn matured, the yields varying from 3 tons 1,300 pounds to 10 tons 1,500 pounds per acre, Longfellow giving the latter yield. The land used for the experiments was not able to hold the water applied to it satisfactorily, and this fact would lower the yield.

• *Roots.*—The average yield of the twenty varieties of turnips tested was 7 tons 895 pounds per acre. A spraying and fertilizing experiment with turnips seemed to show that spraying, especially in combination with fertilizers, has a decidedly favourable effect on the yield. Fifteen varieties of mangels gave an average return of 18 tons 1,543 pounds per acre. Experiments in depth of cultivation of mangels showed a marked advantage in deeper cultivation. In the experiment in which home-grown and commercial mangel seed were compared the results were very much in favour of the home-grown seed, both in yield and quality. Five varieties of carrots and three of sugar beets were also tested.

Grasses and Clovers.—The variety tests for hay gave very poor results this year. The only grasses cut were timothy, western rye, meadow fescue, alfalfa, and red clover. Four crops of Soudan grass were added this year, and made strong growth.

HORTICULTURE.

Fruits.—A commercial orchard of twelve varieties of apples was planted, and an experimental orchard containing two trees each of twenty-eight varieties, in all 1,422 trees. The other trees planted were 112 peach, 84 cherry, 66 pear, 107 apricot, and 164 plum and prune. Owing to the lateness of the season the trees did not arrive as early as expected and had suffered more or less from the severe winter in storage, so that the trees that had remained in the ground all winter grew the best. The following numbers of trees died: apple, 107; peach, 42; cherry, 40; pear, 7; apricot, 17, and plum and prune, 25. A number of small fruit bushes were planted in the spring of 1916, and these have made a fairly good start.

Vegetables.—Many varieties of vegetables were tested this year to determine their relative productiveness, earliness, and quality. Two large plots, half an acre

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each, of Gold Coin and Irish Cobbler potatoes were grown. The half-acre plot of Gold Coin produced 4 tons 600 pounds of marketable potatoes, the Irish Cobbler plot, 4 tons 400 pounds.

Ornamental gardening.—A system of pipes from the domestic system was installed in the spring for the flower beds, and this will also water the lawns. The flowers made a good showing this summer, the roses being especially good for the first season. Preparations were made during the fall for lawns this year.

FARM IMPROVEMENTS.

Buildings.—Four cattle sheds, 16 feet by 28 feet, with yards 28 feet by 70 feet were built in the fall. Water from the domestic pipe line was brought to troughs in the yards, and roads were built. A root-cellar of logs was built into the bank, and a feed-room put at one corner of the root-house, with chutes leading to the root-pulper boxes; and a shed was put up to house the separator. The stables were lined with shiplap, and have been much more comfortable for the horses this winter.

Irrigation.—Before any water was turned into the system it was examined carefully, and when the water was admitted everything was in good order. Only one leak in the syphon pipe was found, and this was stopped by tightening the joint. Measuring boxes were installed in the flumes serving the orchards and where plot work is to be carried on. These boxes cost from \$25 to \$30 each according to size. Where needed, flumes to the various orchards and vegetable gardens were installed. A lot of work levelling the orchards was done in order that more uniform irrigation might be given. All this work was done by home-made tools; the grader cost \$12, and the float \$5. Cutting off the small hills and filling the hollows in the land pays for itself the first year in ease of irrigation, more uniform distribution of water, and better yields. The water was turned on April 25. A good supply of water was available this season, but more will be needed when all the sandy land comes under cultivation.

The municipal dam was opened for the first time on the 15th of August. All water was turned off on September 22. The syphon pipe, when running full capacity, can supply the amount of water contracted for, and has proved very satisfactory. A system of pipes was run from the main domestic line to the flower garden and lawns. This is laid so that it can be drained in the fall. The pressure on this system is now very good.

Roads.—The new grade from the Penticton road to the benches has been finished and gravelled; also the grades to the upper benches. These have been graded and gravelled, and make a big improvement to the heavy sand hills. Many other grades have been improved and widened, and some new roads made where they were needed.

Machinery.—Machinery to the value of \$1,374.25 was purchased at this Station during the season, and consisted of a gasoline engine and separator, binder, feed grinders, fanning-mill, root pulper, cultivators, and platform scales.

EXHIBITIONS.

This station had an exhibit at the fall fairs at Kamloops, Kelowna, Armstrong, Naramata, Summerland and Penticton Poultry Show.

MEETINGS.

The superintendent attended the following conventions, meetings and shows: The British Columbia Fruit Growers' Association Convention (summer meeting) at Penticton; the Western Canada Irrigation Association convention at Kamloops; the British

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Columbia Fruit Growers' Association convention, Victoria; the British Columbia Stock Breeders' Association convention, Victoria; the United Farmers of British Columbia meeting, Victoria; the Women's Institute flower show; the Armstrong seed fair; Farmers' Institute meetings at Vernon, Armstrong, Naramata and Sumnerland.

EXCURSIONS.

This year a marked increase of visitors to the Station has been noticed, and farmers in towns nearby are organizing picnics for the coming year. One Farmers' Institute across the lake has given notification that they wish to come when land is being prepared for seed, during the growing season, and during the harvest.

EXPERIMENTAL STATION, INVERMERE, B.C.**REPORT OF THE SUPERINTENDENT, G. E. PARHAM.**

SEASONAL NOTES.

The season of 1916-17 was on the whole, a favourable one. The spring opened later than usual, and it was not possible to commence ploughing until March 28 and seeding was not begun until the last week in April, a full fortnight later than the previous season.

Much of the clover was winter-killed and had to be reseeded. The spring was cold and backward, with light precipitation until the end of May. During the second week in June there was a very sudden rise in temperature, which was most beneficial to the crops. This sudden change caused a very rapid rise in the mountain streams, and flood conditions caused grave anxiety in the district. The low lands adjacent to the poultry grounds, partly sown to alfalfa and partly devoted to forage-plant test plots, was flooded and destroyed by the swift water. There were no destructive frosts during the growing season, and garden crops and bush fruits did well. The apple orchard was practically destroyed by the severe winter, coupled with high winds which removed the natural snow protection.

The precipitation during June and July was above the average, and aided by the warm weather, hastened the development of crops which, earlier in the season, had been very backward.

The first grain was cut on August 15. The yield in cereals was fair, and the sample good. The fall was favourable for conducting the work of that season, and winter set in on November 10.

During the winter there was a light snowfall and equable temperatures appropriate to the season, but remarkably free from storms so that the snow did not drift to any great extent, and there was a reasonable prospect that fruit trees, clover, etc., would prove to have wintered well. The sun had considerable power in the middle of the day but temperatures at night during the last week of March were close around zero.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Maximum Temperature.		Minimum Temperature.		Precipitation.			Sunshine. Hours.
	Date.	Degree	Date.	Degree.	Rain.	Snow.	Total.	
1916.					Ins.	Ins.	Ins.	
April.....	26	76	23	21	0.62	.....	0.62	182.5
May.....	4	71	11	26	2.89	.....	2.89	179.1
June.....	18	88	7	34	2.01	.....	2.01	202.0
July.....	31	88	23	39	2.32	.....	2.32	271.1
August.....	27	84	4	37	2.01	.....	2.01	269.0
September	1	77	28	24	1.15	.....	1.15	192.2
October.....	16	67	4	20	0.54	.....	0.54	159.2
November.....	1	47	12	-12	0.08	2.5	0.33	84.6
December.....	2	39	27	-31	.....	3.0	0.3	84.4
1917.								
January.....	9	40	31	-25	.....	1.5	0.15	80.1
February.....	12	44	1	-26	.....	3.6	0.36	99.8
March.....	5	42	1	- 8	.....	1.8	0.18	143.7
Totals.....					11.62	12.4	12.86	1,947.7

POULTRY.

The stock at this Station consists of Barred Rocks, Light Sussex, and S. C. Leghorns. Barred Rock and S. C. Leghorn pullets were compared as to egg production and cost of feed consumed, the highest individual records in the two breeds being: Barred Rocks, 178 eggs; S. C. Leghorns, 145 eggs. For artificial incubation three makes of incubator were used. Fattening tests were conducted with six birds each of the Light Sussex and Barred Rock breeds, the six Barred Rocks making an increase of 5 pounds 8 ounces in live weight between November 10 and December 13, while the six Light Sussex birds made an increase of 5 pounds 14½ ounces in the same period. Results obtained from a number of Barred Rocks, each weighing, on the average, 5 pounds live weight, showed that the average loss from live weight to dead weight was 9½ ounces, and the average loss from dead weight to weight when drawn, 14½ ounces.

A great deal of clearing work was done on the slope to the south side of the poultry grounds, and the increased amount of sunlight caused a marked improvement in the health and vigour of the birds.

BEEES.

Eleven colonies were placed in winter quarters in 1915, five in the cellar, and six outdoors. Of the five in the cellar one was found to be dead when the spring examination took place. Two hives wintered in double packing cases outside came through in ideal condition, but of the other four wintered outside only two survived, and these in only fair condition.

The season was very favourable, and the bees gathered a large quantity of honey of good quality, averaging nearly 100 pounds to the colony, the strongest colony gathering 262 pounds during July and August. The total honey crop amounted to 935 pounds, and found a ready sale at 20 cents per pound.

The eight colonies were increased to twelve by division during the year, and in the fall of 1916, six of these colonies were put in winter quarters in the cellar, two

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of the others were left in the open protected by a 4-inch packing in a double packing case, while the remaining four hives were placed in a trench dug into a bank 18 inches deep, and covered with straw and earth.

FIELD HUSBANDRY.

Rotations.—The rotations being tested on this Station are as follows:—

Rotation "A," four years' duration (hoed crop, wheat, peas, oats).

Rotation "B," five years' duration (wheat, roots, oats seeded down, clover, clover).

Rotation "C," oats continuously: This rotation has been modified, and it is proposed to grow fields of oats side by side with the following cultural preparation: (1) oats continuously; (2) oats continuously on land treated each fall with a dressing of barnyard manure; (3) oats growing continuously with clover seeded therewith, the same to be ploughed under for the succeeding crop; (4) oats and summer-fallow alternate years.

Rotation "D," six years' duration (summer-fallow, wheat, peas and oats, summer-fallow, roots, barley).

Rotation "T," three years' duration (oats, clover, potatoes).

Crop Yields.—Wheat on rotation "A" yielded 27.7 bushels per acre; on rotation "B," 31.5 bushels per acre; and on rotation "D," 27.4 bushels per acre. Oats on rotation "A" gave 63.5 bushels per acre; on "B," 60.9 bushels; and on "C," 48.8 bushels. Barley yielded 21 bushels per acre, and roots on rotation "B," 13 tons per acre.

CEREALS.

Three varieties of spring wheat, Huron, Marquis, and Pioneer were tested, and gave yields of 38 bushels, 34 bushels 40 pounds, and 22 bushels 20 pounds, respectively. Banner oats proved superior to Victory and Ligowo, giving a yield of 125 bushels 10 pounds per acre; while Gold proved the best of the four barleys tested, yielding 86 bushels 12 pounds per acre, and Chancellor, the best variety of peas, gave 43 bushels per acre.

FORAGE PLANTS.

Indian Corn.—Twelve varieties of corn for ensilage were again tested, but all were frosted before reaching the best stage for cutting. Salzer's North Dakota gave the highest yield, 10 tons 1,200 pounds per acre.

Roots.—Variety tests were continued with mangels, turnips, carrots, and sugar beets. The mangels were entirely destroyed by cutworms. Of the turnips, Mammoth Imperial Greystone gave a yield of 24 tons 600 pounds per acre, the average yield of the seventeen varieties tested being 13 tons 1,000 pounds. Improved Short White was the best variety of carrot, giving a yield of 7 tons 1,200 pounds per acre, the average for the five varieties being 6 tons 680 pounds. Canadian-grown seed proved superior to two other imported varieties of sugar beets tested.

Grasses and Clovers.—Clover was in many cases winter-killed, and the new crop sown to replace the losses suffered a good deal from cutworms. Alfalfa produced two good crops, and sainfoin also produced two crops and did well on light, dry land which was unsuitable for alfalfa or clover. Alfalfa, alsike, meadow fescue, sainfoin, western rye, red clover, and orchard grass were sown in plots of one-thirtieth of an acre each for seed.

HORTICULTURE.

Fruits.—A large number of apple trees were winter-killed, the only varieties surviving being crabs, and some trees of the Wealthy, Duchess, and Yellow Transparent varieties. Bush fruits suffered considerably from winter injury, particularly

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raspberries and black currants. Of the gooseberries, Oregon Champion, the only variety which has proved immune from mildew, again made good growth and yielded a heavy crop.

Vegetables.—The variety tests and cultural experiments with a number of vegetables were carried on as in previous years.

Ornamental Gardening.—Attractive additions were made to the ornamental grounds by levelling and laying out of further lawns around the house. Annual and perennial flowers were grown, and aster, antirrhinums and sweet peas particularly made a very fine showing.

BUILDINGS.

A new permanent poultry house, 16 feet by 16 feet, on a concrete foundation, was built during the season.

EXHIBITIONS.

An exhibition was again sent out and fairs, besides that of the Windermere district (held on the Station grounds), were attended at Natal, Golden Trail, Nelson, and Needles. There is a continual increase in the correspondence between this Station and farmers in all parts of the Kootenays, who have been brought to a knowledge of the Station and its work by the exhibitions of the past two years.

MEETINGS.

In July the superintendent attended the Irrigation Convention held at Kamloops. In September he attended the Needles Fair, and visited a number of ranchers in the Fire valley. In October he visited many ranches in the Cranbrook district. In February, meetings of the British Columbia Fruit Growers, and British Columbia Live Stock Associations were attended at Victoria, as well as the inaugural meeting of the United Farmers of British Columbia.

VISITORS.

A larger number of visitors were received at the Station than in any previous year, many taking advantage of the fall fair, held on the Station grounds, in September, and manifesting interest in the work being done in the various departments.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF W. H. HICKS, B.S.A., OFFICER-IN-CHARGE.

THE SEASON.

The spring of 1916 was one of the most backward since the Farm was established. The weather for May was a continuation of the wet, cool weather experienced in April; and although there was no frost that month, the temperature dropped to two degrees of frost on one occasion in May. The cool, cloudy weather in June was followed by a very wet July. August was almost all that could be desired. It was the brightest month of the year, with less than an inch of rainfall. September was reasonably fine, and, although there was very little precipitation, there was considerable cloudy and foggy weather. October was dry, followed by a fairly normal November and a winter with somewhat more snow than usual.

The cool, wet spring of the past season kept all the crops behind, but the abundant rainfall during the entire growing season resulted in good yields of root, grain, and hay

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crops. The corn was very slow in growth until August, when it made very rapid progress and yielded a fair crop.

METEOROLOGICAL RECORDS, 1916-17.

Month.	Maximum. Temperature.		Minimum Temperature.		Precipitation.			Sunshine. Hours.
	Date.	Degree	Date.	Degree	Rain.	Snow.	Total.	
1916.					Ins.	Ins.	Ins.	
April.....	26	69	16	34	6.3		6.3	91.8
May.....	24	76	7	30	4.98		4.98	164.2
June.....	17	88	2	42	2.68		2.68	177.5
July.....	30	86	6	42	4.67		4.67	106.3
August.....	24	95	23	42	0.98		0.98	227.3
September.....	16	83	29	35	1.68		1.68	142.3
October.....	9	73	20	29	1.76		1.76	137.1
November.....	6	56	12	25	7.83		7.83	79.1
December.....	1	45	23	16	4.32	24.0	6.72	22.0
1917.								
January.....	8	48	31	-1	6.85	32.5	10.1	43.5
February.....	13	52	1	8	2.62	23.0	4.92	81.7
March.....	26	56	1	12	4.7	9.0	5.6	103.3
					49.37	88.5	58.22	1,376.1

LIVE STOCK.

Horses.—The horses on this Farm are kept only for working purposes, and no breeding or experimental work with them has yet been done. Records are kept of the number of hours' work done by each horse, and the amount of feed consumed. The average feed cost per hour's work done by the heavy-draught horses was 5.04 cents, and of the light-draught horses, 4.5 cents. During the twelve months each horse averaged 190 working days of ten hours each. Two old geldings were disposed of during the year, and a young team of heavy-draught geldings was purchased to replace them.

Cattle.—The Holstein herd of dairy cattle has made a creditable showing during the past year. The breeding work has been continued with the same objects as hitherto. Records are kept of all feeds used, and reports on the production and cost thereof for each cow made. In the experimental feeding of different kinds of silage, clover, and peas and oats have demonstrated their suitability as substitutes for corn in milk and butter production. The health of the cattle has been good. Two tests for tuberculosis failed to detect a reaction. This makes the fourth successive year that the herd has been free from this disease.

An Empire milking machine was installed in November, and is giving good satisfaction. No trouble has been experienced with sore teats. No experimental work has yet been done in comparing this system of milking with the hand method.

During the year approximately eight hundred Stilton cheeses have been manufactured and sold at an average price of 34 cents per pound. A large amount of cream cheese has also been made. Milk testing of composite samples from the Farm herd has been done weekly, also a considerable number of milk and cream samples were tested for farmers in the province.

Sheep.—The flock is considerably larger than it has ever been before. It consists of 67 sheep and 49 lambs, with somewhat more than half of these pure-bred Horned

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Dorsets. The winter just past has been one of the most expensive in the history of the Farm in the maintenance of sheep. They were stabled on November 16, and from then until March 31 obtained very little pasture. The average amount of feed consumed per head during that period cost \$3.46.

A grading experiment is being carried on here, using Dorset Horned rams on smaller, dark-faced, hornless, grade ewes. The Dorset type becomes more pronounced as each cross is made. Seventy per cent of the second-cross animals retained on the Farm have horns, and 80 per cent of them have white faces. Four feeding trials with lambs on fall pasture indicated: First, that it did not pay to feed grain to lambs on good clover or rape pasture; and second, that lambs on rape pasture made more rapid gains than those on clover pasture, both when grain was fed and when the lambs were only allowed pasture.

Swine.—The swine kept on this Farm are of the Yorkshire breed. The breeding herd is housed in A-shaped cabins in the bush on unproductive land. Previous to farrowing, the sows are placed in the piggery, where special attention is given them until the young pigs are strong and active. The best of the young animals are sold for breeding purposes or retained in the herd, while the poorer ones are used for experimental feeding. During the past year eleven males and forty-one females were sold for breeding purposes. The average number of pigs farrowed per sow was 12.07, of which 73.98 per cent were raised. On account of the high price of feed the cost of raising young sows to breeding age was \$6.01, somewhat higher than in previous years.

POULTRY.

The stock kept consists of Barred Plymouth Rocks, Single Comb White Leghorns, White Pekin ducks, and Homer pigeons. Approximately four hundred mature birds, exclusive of pigeons, were carried over the year. During the spring, from 3,362 eggs 1,553 chickens were hatched, or 52.6 per cent of the fertile eggs. Some custom hatching was also done, with moderately successful results. Five makes of incubator were used, and it was found that the Candee coal-burning one cost 42 cents per 100 eggs, and the Cyphers oil-burner, 35.6 cents.

Accurate records were kept of all pens in regard to number of eggs laid and amounts of feed consumed. The pullets of each breed started to lay in September. Experiments conducted in fattening birds for market demonstrated the superiority of the crate over the pen-feeding method.

Thirty White Pekin ducks were kept from 1915, and from these 171 ducklings were raised. The breeding stock was cut down to twelve ducks and five drakes in the spring of 1917.

BEEES.

Four colonies were on hand in the spring of 1916. In early summer one of these became queenless, and was united with another weak colony. Three new swarms were hived during the season; and, the whole apiary becoming queenless, six new Italian queens were imported from Kentucky and successfully introduced. The heavy precipitation in June and July rendered the season an unfavourable one for honey production; only 90 pounds of extracted honey being obtained. The receipts from the honey just paid for the sugar fed and the six queens purchased.

FIELD HUSBANDRY.

Rotations.—The four-year rotation carried on at Agassiz has continued to give good results. In the four years of the rotation the following crops are grown: First year, hoed crop, corn or roots; second year, grain seeded down; third year, hay; fourth year, pasture.

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Crop yields.—The following table shows the amounts of each crop grown in 1916:—

Crop.	Yield.	
	tons	lb.
Corn silage.....	327	140
Clover silage.....	159	1,954
Pea and Oat silage.....	91	730
Mangels.....	178	1,330
Carrots.....	6	400
Sugar beets.....	2	
Potatoes.....	4	800
Clover hay.....	21	780
Pea and Oat hay.....	28	190
Mixed grain (peas, oats, and barley).....	20	1,600
Oats.....	3	1,200
Peas.....	1	1,720
Barley.....	1	

Cultural experiments.—One hundred and forty-six plots are used for cultural investigation work, the main experiments carried on being to determine: (1) The best method of preparing land for hoed crops; (2) the best seasons for applying barnyard manure; (3) methods of applying chemical fertilizers to mangels; (4) the best after-harvest cultivation of root land in preparation for a grain crop to be seeded with clover.

FERTILIZER EXPERIMENTS.

Sixty-five permanent plots are set for this work. They were seeded down to a grass-and-clover mixture, using oats as a nurse crop. One experiment endeavours to ascertain the quantity and proportionate composition of a fertilizer which will yield the greatest profit, some plots receiving the fertilizer elements in combinations of two, while others received the complete fertilizer. Another experiment is to find the relative efficiency of nitrate of soda and sulphate of ammonia as sources of nitrogen; and acid phosphate, basic slag and bone meal as sources of phosphoric acid.

CEREALS.

The usual tests of varieties of grain crops were conducted on uniform plots. Among six varieties of wheat, Huron gave the highest yield, but, calculating on a five-year average, Marquis has demonstrated its superiority. Of the sixteen varieties of oats, Banner is still at the top of the list. Eighty Day gave the best yield of the early varieties. Tests of barley show that the two-row varieties are superior to six-row for this district. Beaver is the best average yielder of the two-row varieties for five years. Solo is the heaviest yielding variety of peas grown.

FORAGE CROPS.

Indian Corn.—Eighteen varieties of corn were tested in one-hundredth acre plots. Six varieties which had proven successful in former years were tested in half-acre plots. Of the eighteen varieties first mentioned, Bailey proved the highest yielder, with 20 tons 400 pounds per acre; and of the six varieties tested on half-acre plots, Golden Glow was the highest, with 19 tons 1,650 pounds per acre.

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Roots.—Sixteen varieties of mangels, five of carrots, and three of sugar beets were grown in duplicate test plots. Tankard Cream gave the best yield among the mangels, Improved Short White among the carrots, and Italian-grown beet seed proved superior to the other varieties. A number of varieties of turnips were tested, but were so vigorously attacked by flea-beetles that the crop was completely destroyed. Some work in the production of mangel seed was also carried on.

Grasses and Clovers.—Twenty plots sown to different varieties of clover in 1915 gave good results. Six plots were sown, at different rates per acre, to Grimm's alfalfa on limed and inoculated soil, the plot sown at the highest rate, 60 pounds per acre, giving the best returns.

HORTICULTURE.

Fruits.—The young orchard is doing well and should be in condition to bear a fairly good crop in 1917. The small fruits, with the exception of strawberries, all yielded well, and the fruit was of good quality.

Vegetables.—Many useful tests, both as to varieties and cultural methods, were carried on with vegetables, and the experiments in the various ways of planting and cultivating potatoes were carried on as a continuation of last season's work.

Ornamental Gardening.—Among the flowers a number of variety tests were made and seed saved. Roses and sweet peas were excellent, and the perennial border was a brilliant show of colour throughout the summer. Many of the flowering shrubs and trees were severely damaged by cold winds in the winter and early spring, more particularly rhododendrons, which were almost a total failure.

FARM IMPROVEMENTS.

Buildings.—There was considerable work done on buildings this past year. A new foundation was placed under the foreman's house, and new floors and underpinning added. The old piggery building was converted into a bull stable, with three roomy pens and a corresponding number of yards, surrounded by a high board fence. This equipment added greatly to the ease with which cross and quick-tempered bulls may be handled. The feed mixing and weighing room in the dairy barn was remodelled and enlarged. A shed, 14 feet wide, was added to the south side and east end of the sheep barn, and the entire building painted.

Water Supply.—The main water supply for the Farm comes from a cement tank on the side of the mountain, which is filled by a small stream. Occasionally in dry weather during the summer this system fails. Last year a good well was dug on the level, and a wooden tower with tank on top was erected. A centrifugal pump, driven by a gasoline engine, supplies the means of filling the tank. This makes a very complete water system.

Fencing.—Fifty-five rods of wire fence, with square cedar posts, was placed around a triangular piece of ground for use as a permanent calf pasture. One hundred rods of old fence was removed and partially replaced by a new one. Sixty rods of chicken wire fence was erected for the poultry department.

Clearing.—Five acres on the east side of the Farm were cleared at odd times throughout the season. Seven additional acres were underbrushed and seeded to grass and clover for sheep pasture during the approaching summer.

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EXHIBITIONS.

A travelling exhibit from the Agassiz Experimental Farm was staged at the following fairs: Vancouver, Chilliwack, Langley, and Maple Ridge. At each place much interest and appreciation were shown. The exhibit has, no doubt, been the means of causing a great many inquiries for information on agricultural subjects.

MEETINGS.

Besides the four fairs mentioned above, the superintendent, or his representative, attended the following meetings: Poisonous Weed Investigation, Kamloops; Western Canada Irrigation Association, Kamloops; Beekeepers' Convention, Vancouver; Live Stock Conference, Victoria; Dairymen's Convention, Nanaimo.

VISITORS.

It is estimated that about 1,100 persons visited the Farm during the year.

EXPERIMENTAL STATION, SIDNEY, B.C.**REPORT OF THE SUPERINTENDENT, L. STEVENSON, B.S.A., M.S.**

SEASONAL NOTES.

The spring of 1916 opened very late, wet, cool weather prevailing until the last day of April, making seeding operations four weeks later than usual. Excessive drought prevailed during June, July, August, and September, creating conditions of soil dryness which hindered the development of spring-sown crops, and made soil tillage difficult. The dry summer conditions again emphasized the necessity of increased attention to autumn-sown crops, crops that will make some growth during the winter and complete development and ripening before the dry period commences in July.

METEOROLOGICAL RECORDS. 1916-17.

Month.	Temperature F.		Precipitation.			Total Sunshine.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
	°	°	Inches.	Inches.	Inches.	Hours.
1916.						
April.....	61.0	32.0	1.52	..	1.52	155.6
May.....	74.0	32.0	0.73	..	0.73	251.9
June.....	83.0	40.0	0.55	..	0.55	270.5
July.....	81.0	46.0	1.72	..	1.72	220.9
August.....	85.0	47.0	0.32	..	0.32	306
September.....	72.0	39.0	0.66	..	0.66	195.4
October.....	64.0	35.0	2.01	..	2.01	145
November.....	56.0	28.0	3.18	..	3.18	103.9
December.....	48.5	23.5	5.74	8.50	6.59	31.4
1917.						
January.....	49.0	9.0	2.45	16.25	4.07	57.6
February.....	48.0	19.0	1.59	13.84	2.97	41.8
March.....	49.0	24.0	2.72	..	2.72	131.6
Total for the year.....	23.19	38.59	27.04	1,911.6

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LIVE STOCK.

Horses.—Only work geldings are kept at this Station. These received the following daily ration from April 1 to October 31: 1 pound crushed oats, 4 ounces wheat bran, and 1 pound mixed hay per hundred-pound live weight of horse. From November 1 to March 31 the grain ration remained the same, but rye hay was substituted for mixed hay, and, in addition, each horse received 3 pounds of carrots per day.

Cattle.—The Jersey herd from Lacombe, consisting of a bull and nine females of various ages, was established on the Sidney Station in December, 1916. These cattle have now become used to the climatic conditions, and have improved considerably.

POULTRY.

Four flocks of chicks were purchased in April and May. These were fed up to eight weeks old at a cost of 9.5 cents each. Out of 1,050 chicks purchased, 424 died during the first eight weeks. The chicks were raised in a portable brooder house, heated by a Simplex oil burner brooder stove. The cost of heating this house, which accommodated 750 chicks, amounted to 2.9 cents per chick for a period of twenty-eight days. An experiment to determine the value of milk albumen as a substitute for skim-milk in chicken fattening was carried on. The cost of 1 pound gain with birds fed skim-milk was 8.9 cents, while when milk albumen was substituted the cost of 1 pound gain was 15 cents. Thirty cockerels were caponized at three months old, and when eight months old weighed, on an average, 8 pounds 2 ounces each. They were sold at \$2.43 each, realizing a net profit of 91½ cents per bird.

The average cost to feed a White Wyandotte pullet to five months old was found to be 45½ cents; and to feed a cockerel to eight months old, \$1.15.

Fifty-two pullets, hatched April 1, in six fall and winter months laid 5,341 eggs at a feed cost of 13.6 cents per dozen; while fifty-three pullets, hatched May 1, in the same period laid 4,020 eggs at a feed cost of 14.5 cents per dozen. All birds were trap-nested.

BEES.

The work with bees has been continued, with no marked improvement in production of honey. Bee pasture is not sufficiently abundant in the forested districts to make bee-keeping a very profitable business. The net return per hive for the past three years has been under 10 pounds per annum.

FIELD HUSBANDRY.

Rotations.—The main farm rotation at this Station is a three-year one and is carried on on two plots of 18 acres each. On one plot the rotation years are wheat, clover, corn; on the other plot, oats and peas, clover, corn. Manure is applied every third year. This rotation ensures an abundance of fodder for the stock, reduces the cost of crop production, maintains soil fertility and checks weeds.

A three-year rotation, consisting of corn or roots, grain, clover or other legume is also carried on in connection with the cereal and fertilizer work.

Crop yields.—Twelve acres were sown to Banner oats, and yielded 52 bushels per acre at a cost of 46 cents per bushel. Five acres under fertilizer experiment, sown to Garton oats, gave a yield of 47 bushels per acre at a cost of 48 cents per bushel. This high cost was largely due to the cost of removing stones and roots from the fields before seeding.

Six acres of Canada white field peas yielded at the rate of 22 bushels per acre, and one and a half acres of Solo peas, 29 bushels per acre, the cost of production of the

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Canada White peas being \$1.25 per bushel, and of the Solo variety, 94 cents per bushel.

Rye, oat, and pea and clover hay gave a total yield of 70 tons 700 pounds.

FERTILIZER EXPERIMENTS.

In an experiment to ascertain the quantity and proportionate composition of a fertilizer which will yield the greatest profit, different plots received applications of fertilizing elements singly or in combinations of two, while other plots received a complete fertilizer. Another experiment was carried on to discover the most efficient sources of nitrogen and phosphoric acid. Here different plots received applications of various amounts of nitrate of soda or sulphate of ammonia as sources of nitrogen, and of acid phosphate, basic slag, or bone meal as sources of phosphoric acid.

CEREALS.

Twelve varieties of winter wheat were sown on September 16. Saanich gave the best yield of 59 bushels 30 pounds per acre. Four varieties of autumn rye, also sown September 16, gave yields varying from 1,845 pounds to 2,160 pounds per acre, Thousandfold giving the latter. Tapp's Winter gave better returns than Arlington Awnless, the other winter barley tested. Two of the four varieties of winter oats under test winter-killed and, of the remaining two, Winter Turf gave a greater yield than Fulghum. Of the seven varieties of spring wheat, Wild Goose gave the highest yield; and of the eight varieties of spring barley, O.A.C. No. 21 was the best. Three varieties of field beans and three of lupins were also grown. Two varieties of tares and three of vetches were seeded, and all made satisfactory growth. Of the eleven varieties of peas tried, Solo proved the heaviest yielder, and of the nine varieties of oats, several of these being new varieties obtained from New Zealand, Banner again headed the list.

FORAGE PLANTS.

Indian Corn.—Nineteen varieties of corn were tested for fodder production, and gave an average yield of 5 tons 1,885 pounds per acre, Stowell's Evergreen heading the list with 11 tons 1,725 pounds per acre. All flint varieties and four of the dent varieties ripened.

A number of crosses were made with a view to obtaining an early-maturing, heavy, grain-yielding ensilage corn and a heavy-yielding high-quality fodder corn.

Roots.—Five varieties of swede turnips gave an average yield of 17 tons 880 pounds per acre, the highest yielder, Mammoth Clyde, giving 18 tons 1,550 pounds per acre. Of the twelve varieties of mangels, Giant Yellow Globe, the highest yielder, gave 15 tons 300 pounds per acre, the average yield per acre being 12 tons 1,767 pounds. Ontario Champion proved the best of the five varieties of carrots tested, yielding 21 tons 1,050 pounds per acre. Three varieties of sugar beets were tested, and a comparison between home-grown and commercial mangel seed showed the superiority of the former.

Grasses and Clovers.—Three cuttings were taken from the Canadian Variegated alfalfa. Four varieties of millet and three varieties of feeding kale were also tested.

HORTICULTURE.

Fruits.—The orchards established during the past three years have developed very satisfactorily. Small quantities of apples, plums, pears, cherries, filberts, quinces, and medlars were obtained. Various spraying experiments were carried on, and a test of

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a home-made tobacco solution made. The experimental nut orchard occupies 6 acres, but all the trees are young.

The production of small fruits was below the average of previous years; white, black, and red currants, raspberries, gooseberries, blackberries, strawberries, and grapes being grown. A number of trees were imported from foreign countries, and tested.

Vegetables.—A number of variety and cultural tests were carried on with vegetables, and considerable work was accomplished during the season in vegetable seed production.

Ornamental Gardening.—Variety tests with annual and perennial flowers and bulbs were carried on, and considerable attention was given to an investigation of the possibilities of flower seed and bulb growing. The arboretum area, consisting of $7\frac{1}{2}$ acres, now contains some four thousand five hundred trees.

BUILDINGS.

A dairy barn 58 feet by 28 feet in size, and of a design suited to Vancouver Island conditions, was erected during the autumn. A silo, 10 feet in diameter and 30 feet high, was built of fir staves. A bull pen, 14 feet by 14 feet, and a manure shed, 14 feet by 20 feet, were built in suitable design and at very small cost. Two permanent hen houses and five small colony houses for poultry completed the building operations for the year.

FARM IMPROVEMENTS.

A 4-ton weight scale was installed on a suitable cement foundation.

Electric light and power lines were erected to convey electric current to the dairy barn and poultry buildings.

The roads have been improved by gravel, and short additions have been added where needed.

Wire fencing to enclose cattle and poultry areas has been erected.

A great deal of landscape planting was done during the winter and spring.

EXHIBITIONS.

The following exhibitions were attended, and an educational exhibit set up at each: South Saanich Women's Institute flower show, West Saanich Women's Institute flower show, Parksville Agricultural Society autumn fair, Alberni Agricultural Society autumn fair, Ladysmith Agricultural Society autumn fair, Cowichan Agricultural Society autumn fair, North and South Saanich Agricultural Society autumn fair, and the provincial seed fair at New Westminster. A permanent exhibit has been maintained in Victoria.

MEETINGS.

The superintendent attended the South Saanich Flower Show and the West Saanich Flower Show as judge of flower exhibits, the Vancouver Exhibition, the Cowichan Agricultural Society fair at Duncan, the Alberni, the Parksville, and the Ladysmith fairs as judge of live stock.

The following Institutes, Growers' Associations, Boards of Trade, and Agricultural Associations held meetings to be addressed by the superintendent of this Station: Metchosin Farmers' Institute, Saanich Farmers' Institute, Sidney Board of Trade and the Seed Growers' Association at Duncan and at Victoria, also at the Provincial Seed Fair held at New Westminster, and the Women's Institutes of West Saanich and South Saanich. All addresses were on some phase of agriculture and production.

